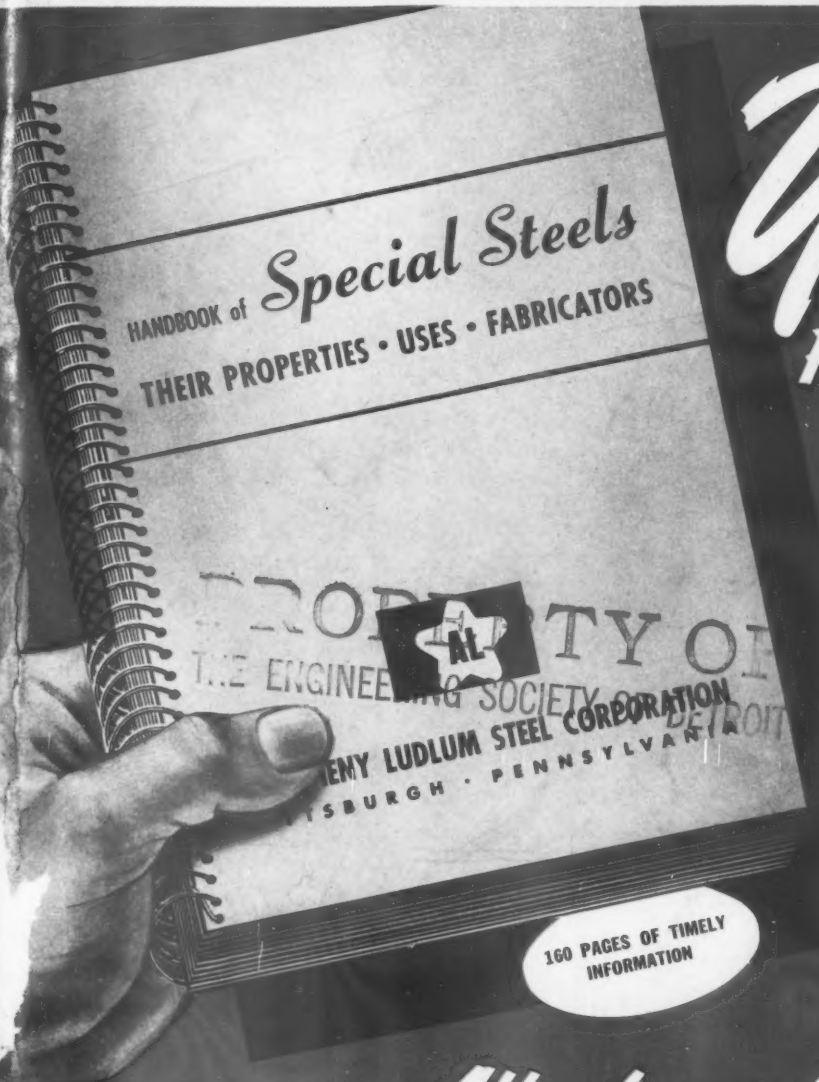
NOVEMBER, 1940

The TOOL ENGINEER



160 PAGES OF TIMELY INFORMATION

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CONDENSED TABLE OF CONTENTS

Chapters are devoted to an exhaustive treatment of the following subjects:

Tool Steels, including Drill Rod and Bits.
Stainless and Heat Resisting Steels.
Nitralloy and the Nitriding process.
Electrical Steels and Non-Magnetic Alloys.
Carbon Steels, hot and cold rolled strip, Castings, Pipe and Tubing.
Special Products such as Valve Steel and Hollow Drill Steel.

An entire section is devoted to tables, charts and reference data.

Finally there are tool steel and stainless steel classified directories of the fabricators of these Allegheny Ludlum steels, which provide a comprehensive listing of product sources.

All this plus data sheets supplying complete instructions for best shop practice on each Allegheny Ludlum Steel is available for the asking.

Allegheny Ludlum STEEL CORPORATION

Tool Steel Division: Watervliet, N. Y. General Offices: Pittsburgh, Pa.

Official Publication of the
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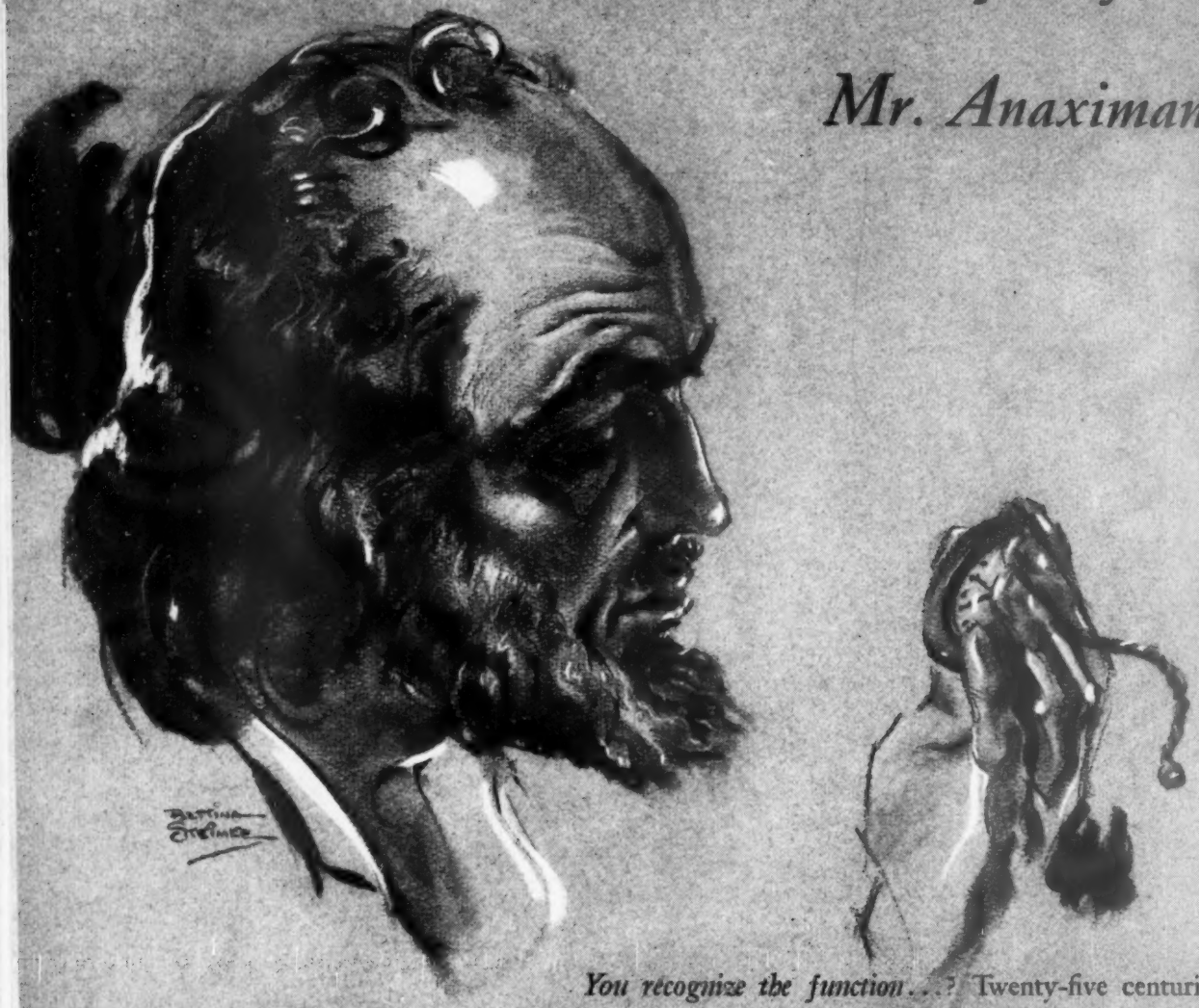
...and it works on a rainy day,

Mr. Anaximander



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Oh yes, they keep good time. They're well made. T[illegible] chines that father them maintain a uniformly high stand[illegible] accuracy... because these machines are in turn built w[illegible] aid of other machines that cut and turn and shape and drill and grind to a degree so fine that their work must be measured in tenths of thousandths of an inch. If we had to make all our watches by hand we'd probably go back to your sundial—and guess the time on rainy days!

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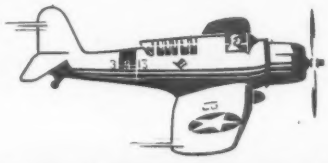

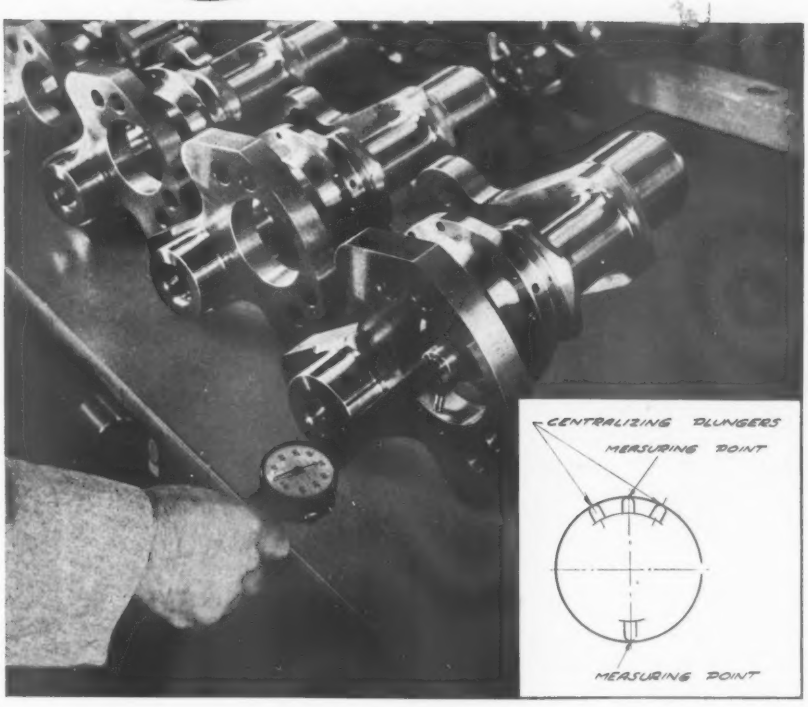

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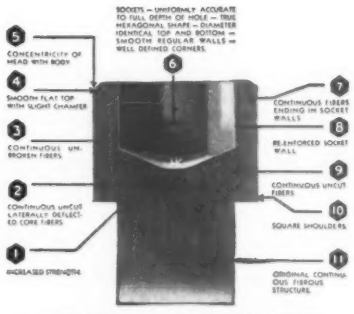
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THE TOOL ENGINEER

"America in the Making"

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Published by
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2842 W. Grand Boulevard
DETROIT, MICHIGAN
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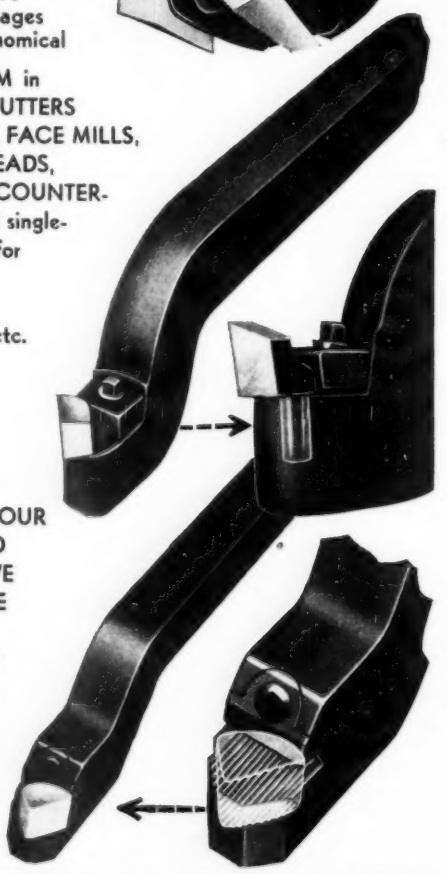

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Tough materials, large work, close limits of accuracy—even under these conditions the building of tanks and tank engines demands speed and production efficiency of the highest order. The design of P & J Automatic Chucking Machines and their rugged construction offer literally hundreds of possibilities for the improved production of tank parts.

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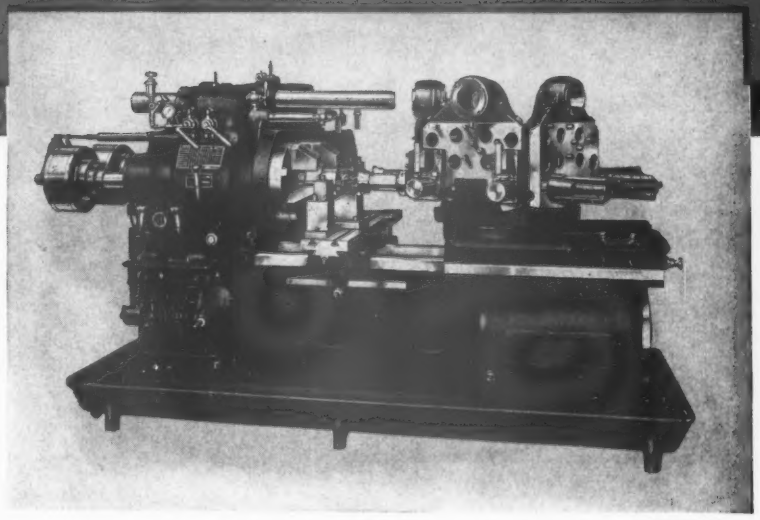
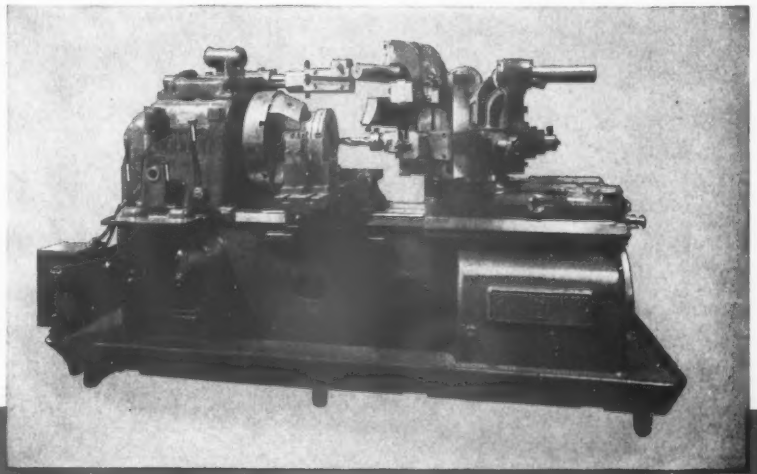


Above: The 5D Power Flex 2-spindle model Automatic Chucking Machine. Unique construction provides an increase in output per square foot of floor space . . . conservation of power . . . moderate initial investment.

Below: P & J Power Flex Automatics are the leading automatics of the single spindle type. Features: Four automatic changes of feed . . . three selective automatic changes of feed . . . makes all automatic changes while under cut.



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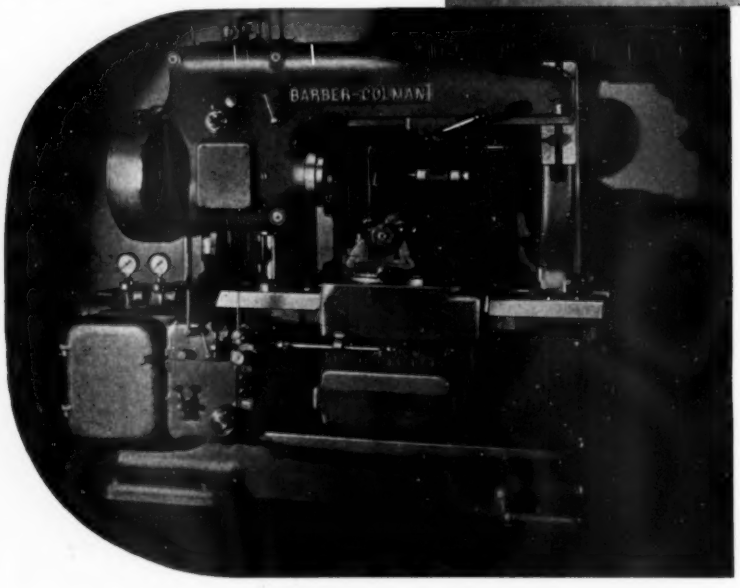

EFFECTIVE LUBRICATION

in this Barber-Colman hydraulic hobbing machine is assured by a combination of good design and the selection of suitable materials. High carbon Nickel Cast iron gears are structurally designed to assist in full lubrication and accordingly to reduce gear wear and assure quiet and satisfactory operation of a unit. Adding Nickel to cast iron induces dense grain in gear castings and markedly increases their resistance to wear.

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Barber-Colman Hobs *Produce!*

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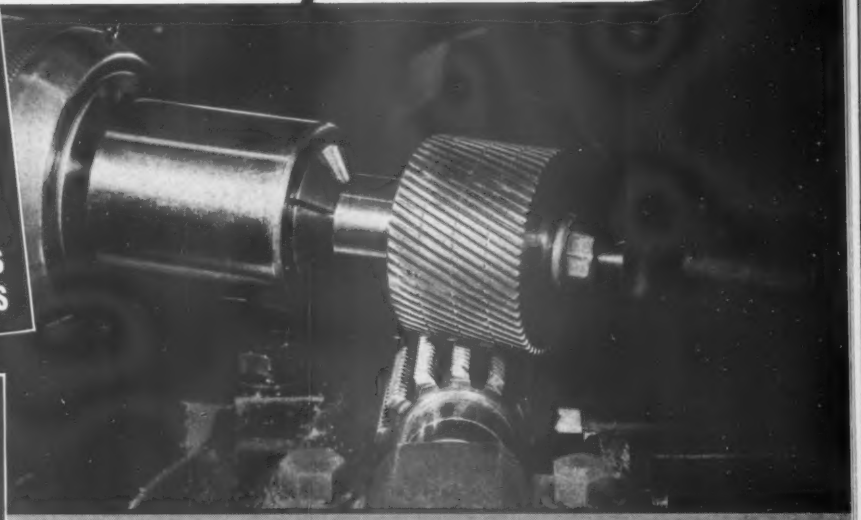
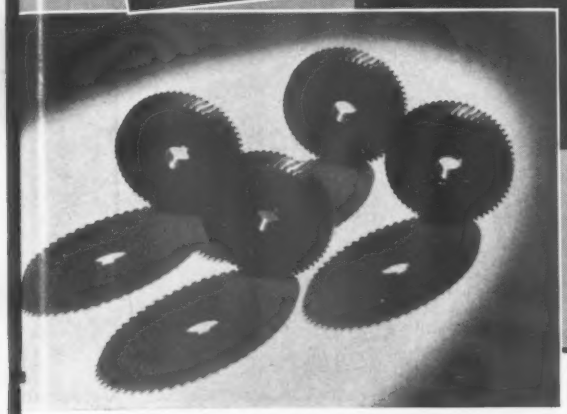
58,500 Pieces Total Hob Life
PLUS Extra Accuracy and Fine Finish
HOBBING SPIRAL GEARS FOR SKILSAW TOOLS





You, Too, Can Have This Precision High Production and Economy by Using Barber-Colman Hobs

Many production men have found that Barber-Colman Complete Hobbing Service has helped them to improve their product, and lower manufacturing costs.

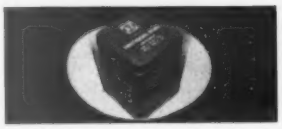
This job at Skilsaw, where only the best is good enough, is a typical example. Four spiral gears are hobbed at one time in 20 minutes floor-to-floor. Barber-Colman ground hobs are used, and the job is done on a Barber-Colman No. 3 Hobbing Machine. Hob life averages 900 pieces per grind for 65 sharpenings, or 58,500 pieces total.

If you are not getting the accuracy and finish you desire, or think your hob cost is too high—try Barber-Colman hobs. If your problem is difficult or unusual, ask for a Barber-Colman field engineer to call. He'll be glad to help you.

Gears for the extensive line of motor-driven saws and drills built by Skilsaw, Inc., Chicago, Illinois, are cut with B-C Hobs and Hobbing Machines. These speed reduction drives require exceptionally strong, accurate, quiet-running gears.

Brief Job Facts

Name of Part — Skilsaw Drill Spindle Gear.
Material — 1315 S.A.E. steel.
Operation — Hobbing Helical gears; 30 pitch, 59 teeth; 2.162" outside dia.; 3/8" face; 2.096" pitch dia.; 2.019" root dia.; 14½° pressure angle; 21°2' helix angle; four gears per load.
Hobbing Machine — Barber-Colman No. 3.
Hob Used — Barber-Colman Class A Ground Hob; 1⅞" dia. by 1½" long; single thread; 13 gashes.
Cutting Method — One cut, conventional.
Hob Speed — 309 r.p.m.
Hob Feed — 0.019" per rev. of work.
Production Time — 20 minutes per load of 4 gears, floor-to-floor; 12 gears per hour.
Number of Settings — 4.
Pieces per Grind — 900.
Hob Life — 65 sharpenings, or 58,500 gears.



Individual metal containers protect your B-C hobs in shipment and storage. Blue boxes signify ground hobs, and green boxes unground hobs. Specifications are clearly marked on each box, simplifying the finding of the desired hob in your storage rack.

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—covering B-C extensive line of hobs, cutters and reamers.

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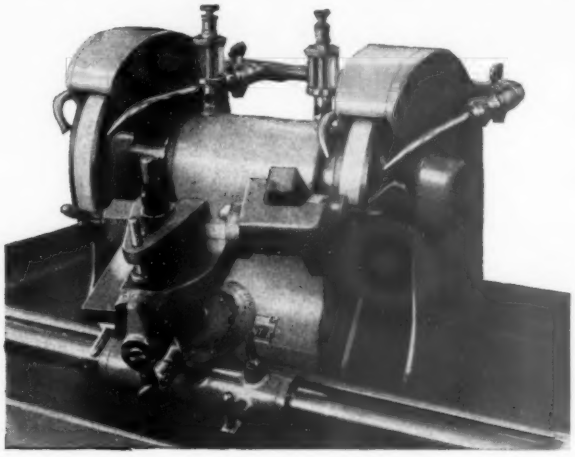
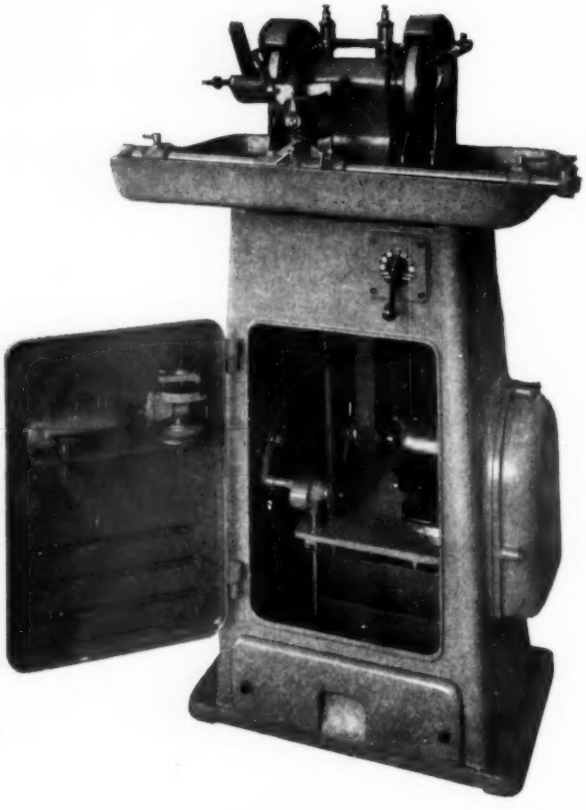
Type 175-A

GRINDING AND LAPPING MACHINE

For Carbide Tools up to 1⅝" square shank



Nitrided Spindle operating in bearings of exceptional quality, operating 7 inch Wheels without vibration.



Furnished with universal tool posts, establishing correct form and clearance angles, and transfers from the roughing wheel to the finishing wheel ***without disturbing the setting.***

The vibrationless spindle makes fixed grinding (with micrometer feed) possible and desirable.

Uses both sides of each wheel, so that tool can be properly presented to the cutting surface.

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BRING IN YOUR TOOLS FOR DEMONSTRATION

RUSSELL, HOLBROOK & HENDERSON, INC.

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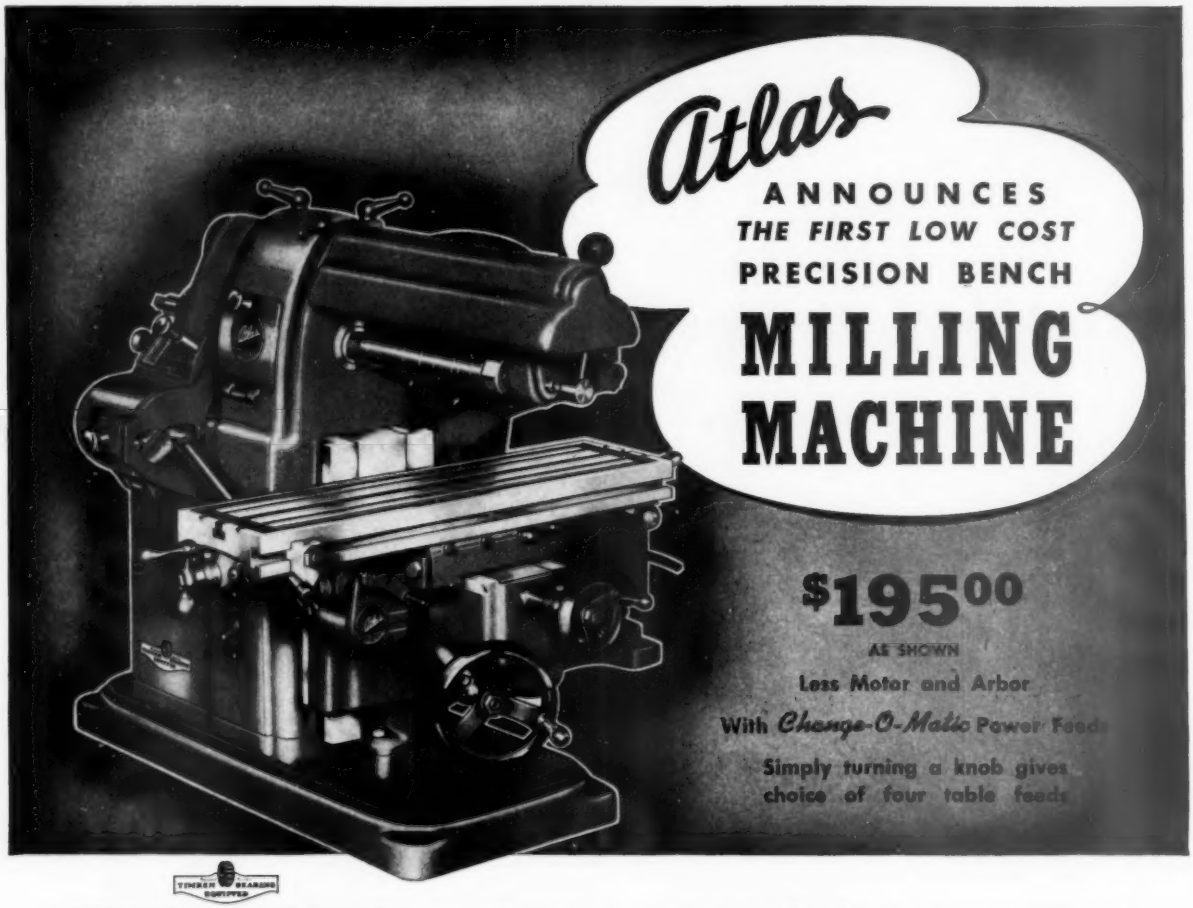

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Longitudinal Travel with "Change-O-Matic"	10"
Feed Range with "Change-O-Matic,"	.162" to 9.125" per minute
Cross Travel	3½"
Vertical Travel	6"

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12 Spindle Speeds between	54 and 3225 RPM
Spindle Taper	No. 2 Morse
Hole through Spindle	17/32"
Spindle Bearings	Timken Tapered Roller Bearings
Arbor Diameter	⅞"
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Overall Dimensions	25½" x 32½" x 22" high
Base Dimensions	20½" x 18½"
Motor Recommended	1/3 HP 1740 RPM
Weight less Motor, with "Change-O-Matic" Feed	200 lbs.
Price less Motor, Standard Screw Feed	$175.00
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On paper for years—in tooling for the past two years—we've now completed development of this new Atlas Milling Machine to help meet the urgent machine tool needs of the nation.

It's a remarkable miller—ruggedly built, accurate, efficient—just the machine to cut costs on all types of small milling jobs in tool room or shop. Low in initial cost, low in set-up time, and low in operating costs (operates from ⅓ HP motor).

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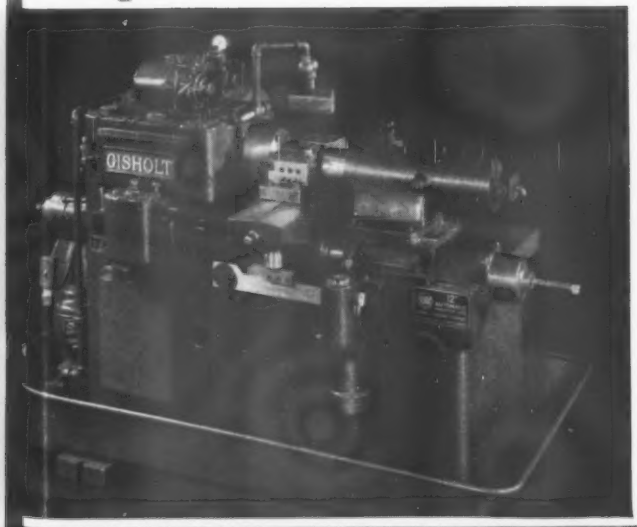

WHERE overloaded schedules require faster production—where quick setups are desired to handle a variety of between-centers and chucking work . . . look to this new Gisholt No. 12 Hydraulic Automatic Lathe.

Above, you see it machining Diesel engine injector bodies 42% faster than the automatic lathe it replaced. Tests in other plants show time and cost savings as high as 82%.

Ideal for the production of cluster gears, bevel gears, differential carriers, medium caliber shells and a wide variety of cylindrical parts, this highly advanced machine is fast, accurate, simple to operate. It is extremely flexible, with an unlimited change of pace in speeds and feeds. Ask your nearest Gisholt representative to tell you about it.

★ *The Gisholt No. 12 Automatic Production Lathe is hydraulically operated, and all its functions are controlled with a single lever centrally located. The operator has only to start machine; chuck and unchuck the work. Tools cut to close tolerances and may be re-set by means of micrometer adjustments. Write for literature.*

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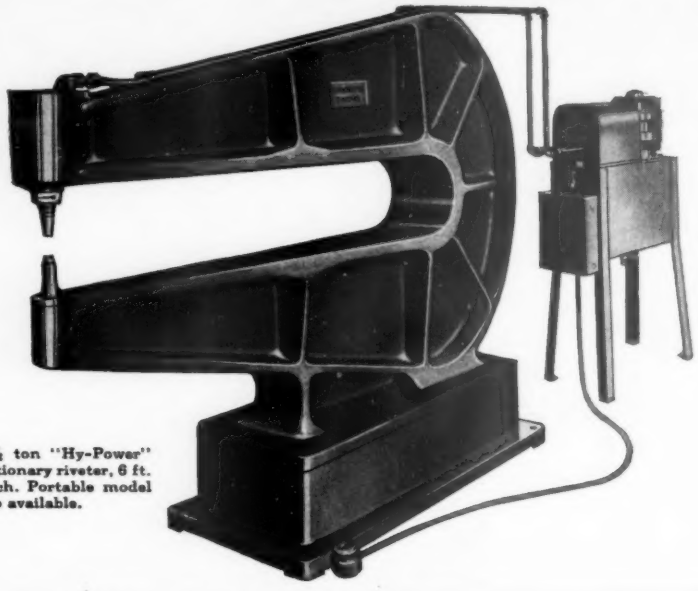
17½ ton "Hy-Power" portable hydraulic riveter



17½ ton "Hy-Power" stationary riveter, 6 ft. reach. Portable model also available.

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Only Hannifin "Hy-Power" hydraulic equipment combines the high speed operation and ease of handling that means increased production with less work. Operators maintain high production rates with less fatigue, for "Hy-Power" hydraulic equipment is designed to minimize handling and effort.

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The Tool Engineer

The Way of All Flesh?

AN ENGINEER of considerable experience, a Mr. Carl Dreher, contends that the profit motive as a basis for industry has failed and that to meet the challenge of the world revolution now in progress we must adopt a system of "democratic collectivism" which contains all the good points of efficiency of the corporate state and all the good points of freedom of a democracy.

This sounds fine.

But we don't think he will get the support of many Tool Engineers.

In Mr. Dreher's Utopia the job of planning "will have to be delegated to a certain body of the most capable and disinterested engineers in the country." That sounds efficient. That sounds almost as efficient as fascism. But is it democratic? Can there ever be such an anomaly as a democratic collectivism?

We believe that there cannot.

And we believe that engineers today must be careful not to be led astray and become involved in political theories which are fundamentally false.

In the first place we do not believe that the profit system has failed. It seems strange that America could have become the greatest and most prosperous nation in the world by doing everything wrong.

Looking into the plan further we find a reference to "men and machines in the mass." Now we come to the point. Mr. Dreher is considering men in the mass, as you always must do in a collectivist government. When you do that it doesn't much matter if the rights of one man, or a hundred, or a thousand, get trampled in the process so long as the state moves forward.

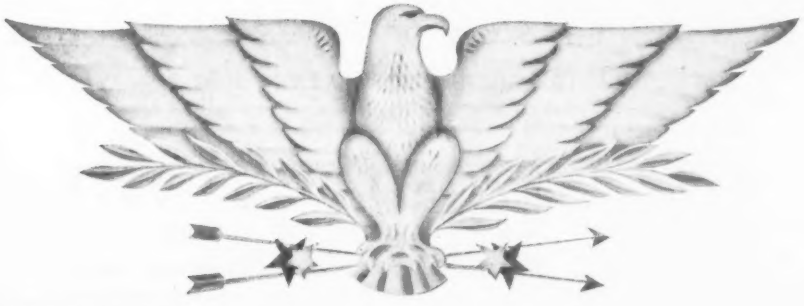
Democracy does not work that way.

Sure it's inefficient. Sure it makes mistakes. But it considers men as individuals rather than as a mass.

The best expression of this difference we have ever seen was given by Congressman Pettengill when he wrote that a democracy is like everybody getting into their cars and driving around the country. There are some accidents, a few people are killed, some break the traffic regulations, but by and large they get where they are going and have a respect for the rights of others. A collectivist government, on the other hand, is like everybody getting in one big car and setting out on their trip. If they get a good driver then all goes well and all make the trip safely, but if they get a drunken driver then the whole works goes smash. *And sooner or later every collectivist government gets a drunken driver.*

So in the trying times ahead, if as engineers we are prone to become exasperated with the inefficiencies of our government and the little wrecks here and there, let us pause before we give ear to any such schemes as this democratic collectivism—of which there will be many—and let us, as Tool Engineers, ask the question, "Is this added efficiency worth the cost of the dies involved?"

Then will we remember, with Lincoln, that man is worthy to be free, and with Jefferson that "That government is best which governs least."



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Gyro pilots are extremely intricate and every part must be manufactured with unusual care and precision.

In this picture of the oil sump assembly can be seen 14 different "GTD Greenfield" Gages—reasons why this part will be *right*.

A long-time record for accurate manufacture, the development of special methods for giving gages long life (such as our "Rex" surface treatment) and our experienced gage engineering service make "GTD Greenfield" Gages especially interesting to any manufacturer who wants to make the most profitable use of his gage investment. A study of your needs will be made without obligation.

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THE PRESIDENT'S REPORT

Delivered at the Fall Meeting of the American Society of Tool Engineers

A YEAR ago this month our Society had 27 Chapters with a total membership of less than 3700. Today we have approximately 5400 members located in 38 Chapters in this country and Canada. We are aiming at a membership of 7000 good and true Tool Engineers by next March, which should not be too difficult to attain considering the great prestige our Society today is enjoying, due to the valuable services we are rendering to our membership, industry, and our Government. All of our Chapters are in a healthy condition with fast growing memberships and programs scheduled for the 1940-41 season, that will be of great interest and value to men of the Tool Engineering profession.

Now, just a few words regarding our eleven National Committees. The Chairmen and members of these important committees all are busy Tool Engineers, but never too busy to devote much of their spare time to this important work of our National Society. The Standards Committee headed by Mr. Ernest has done a splendid job, meeting several times during the past six months, recently having an important meeting in New York with the American Standards Association, of which we are a member. Of further interest to most of you will be the announcement that the A. S. T. E. has initiated a request through the A.S.A. to classify and standardize tool steels. This petition was voted upon favorably by the Standard's Council of A.S.A. and we believe the way has been opened for starting work on the standardization of tool steels and cutting material.

Our Editorial Committee headed by Mr. Holland, already has made marked improvements in our monthly magazine THE TOOL ENGINEER, both in regard to the quality of articles appearing in same as well as the general makeup of the magazine.

Educational Committee

The Educational Committee made up of plant executives and educators, with Herbert D. Hall as Chairman, has done an outstanding job in formulating an Educational and Training Program for the development of Tool Engineers, so vital in our National Defense Program. In a recent survey conducted a few months ago by our National Office, relative to the shortage of skilled men in our Metal Working industries, it was learned that there existed a shortage of over 40,000 Tool Engineers, 125,000 Tool and Die makers and over 400,000 skilled mechanics. With the rapid plant expansions during recent months to take care of the fifteen billion dollars defense program, these figures can safely be doubled at the present time. Industry does not swing into mass production by merely waving a wand as many politicians seem to believe.

President d'Arcambal

"I have a great admiration . . ."

Modern factory structures equipped with the finest in machine tools, cutting tools and gauges, are, of course, essential to efficient production; but the general public does not realize that without the proper originating, designing, planning and scheduling of all work operations, it is impossible for a plant to operate successfully. The Tool Engineer therefore occupies a key position today in our defense program as well as in our future development. We sincerely trust that our High Schools, Trade Schools, and Colleges will adopt the Educational and Training program advanced by our Society as Industry should not be made to assume the full burden of training graduates, as is the case today, due to our educational schools turning out men ill-equipped to assume their position in industry.

Our Society has offered its services to Mr. Knudsen of the National Defense Committee as well as to other important Government Agencies during this critical period. Our Executive Secretary, Mr. Ford Lamb, visited Washington two weeks ago at the request of two Government Agencies as a result of our offering the services of our Society to our Government and we were put on their roles as consultants and advisors.

Our Society is creating educational committees in each of our 38 Chapters, subject to the approval of our Directors. These Committees will provide direct contact between the best brains in the Tool Engineering field and the educational work necessary to our National Defense.

The annual meeting in conjunction with our Machine and Tool Progress Exhibition will be held in Detroit the week of March 24, 1941. Education is the theme of this show, only exhibitors with products of interest and value to our membership being assigned space, operating exhibits being requested wherever possible. With industry facing the largest expansion in our history, and a shortage of close to 100,000 Tool Engineers existing today, it is highly important that available Tool Engineers have an opportunity to view and study the latest developments in machines, tools, processes and methods of production. This opportunity available to all provides the simplest and most effective way to bring one up to date on new developments.

I have a great admiration for our Society as do all others who have been privileged to work for same even at a considerable personal sacrifice. The increased service we are rendering our membership and industry, offered by no other Society, can only mean that our healthy growth will continue with an ever increasing prestige until the day is reached in the not distant future when the A.S.T.E. will be the largest technical Society in the United States, of great service to our Government, Industrials and our Membership.

A. H. d'Arcambal, President,

American Society of Tool Engineers.

PROBLEMS of LIMITED P

Tool Engineering is not always mass production. Here it is at its best in meeting limited production problems.

A NEW high in compact efficiency has been reached at the Lincoln Plant of Ford Motor Company on the production of 1941 models. Previously bodies had been built elsewhere and shipped to the plant for final assembling operations. When it was decided to build the bodies right in the Lincoln Plant, and

Upper Picture

Pillar Forming Blocks

This view of a corner of the Lincoln plant shows a group of the pillar-type forming blocks which are used so extensively instead of dies in low production work. These blocks are used as a base over which the parts are hammered by hand.

Center Picture

Rear Deck Forming Block

A more complicated forming block is used for shaping the rear deck lid opening. The upper portion of the block is raised and the part placed over the lower form. The upper portion is then lowered into position and the part is clamped rigidly in place while the deck lid opening is shaped.

Lower Picture

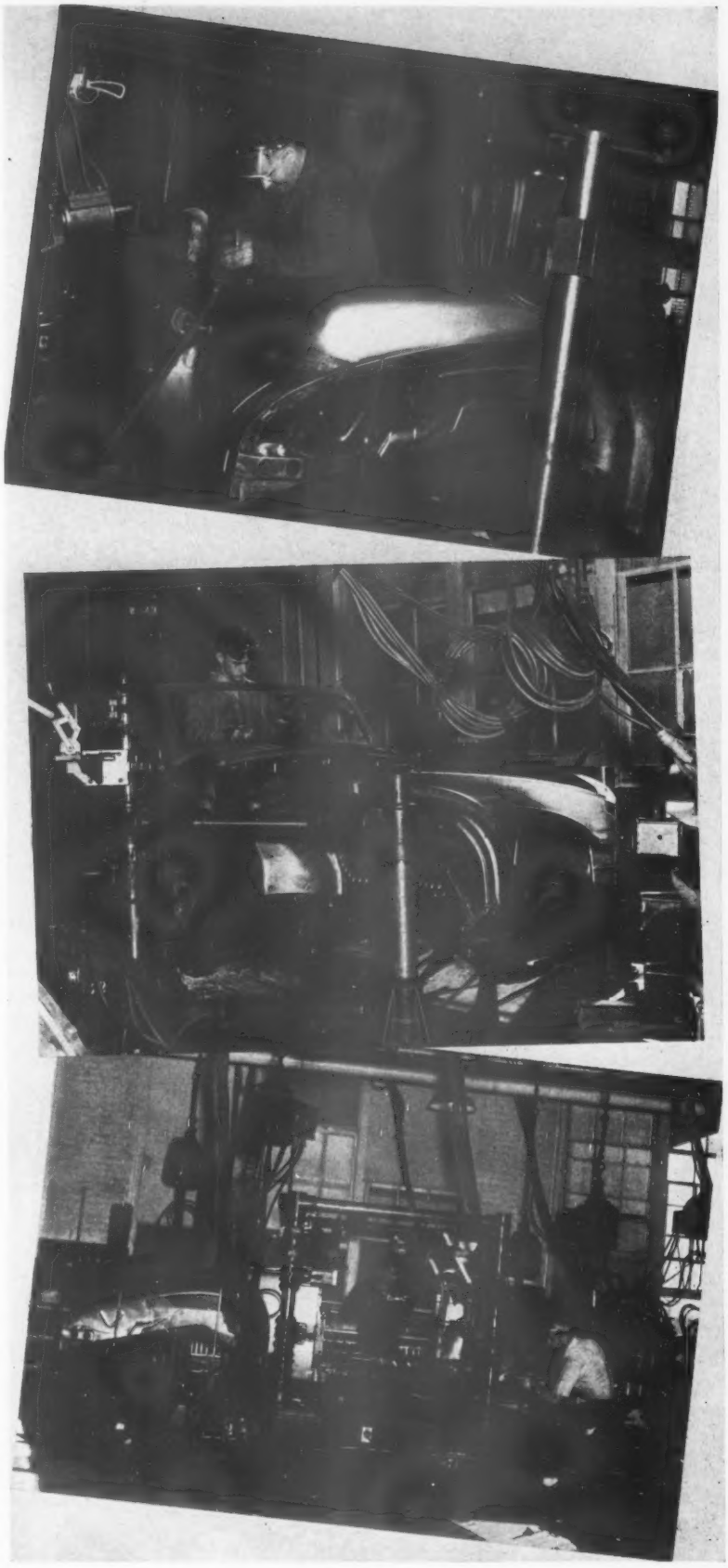
Roof Rail Forming Block

In this third type of forming block a roof rail is formed. The rotary sheared blank is shown in the foreground and the workman is holding a finished part. Note the swiveled clamps which drop over block to hold part in place.

D PRODUCTION

by
WALTER F. WAGNER
Master Mechanic, Lincoln Motor Co.
with J. A. ASHBURN
(Photographed for THE TOOL ENGINEER by the Ford Motor Co.)

to undertake this additional operation without adding to floor space, the Tool Engineers faced a problem of machine design and plant layout such as has been seldom equalled. The most spectacular reduction was in the motor assembling division which was cut down to a quarter of its former size. Approximately twenty-



Upper Picture

Welding Rear Quarter

Assembly of the various shaped parts is done in sections. Here the rear quarter of a convertible model is being built up as preparations are made to weld the tire well panel into place.

Center Picture

Front End Assembly

Similarly the front end assembly of the same car is built up in another buck. Notice how the bucks are built up economically from standard stanchions and fittings. Clamps swing into place to force flexible metal parts into proper position before welding.

Lower Picture

Complete Body Buck

The front and rear end assemblies shown in the two previous pictures are now transferred to this complete body buck and the body assembly is completed. This buck is also used in the assembly of Continental Sedans and the clamps are all quickly adjustable to fit either of the two body styles. Note the easy accessibility of all the welders. These slide on conveyors and may be moved clear for final removal of the body.

five percent of the additional space was gained through the elimination of surplus machinery, and the remainder by closing up aisles and by good plant layout.

The skeleton frame assembly starts on the top floor of the plant, five miles of conveyor carrying the assembly line downward in a corkscrew path to the finished automobile. When the step was first contemplated many competent observers felt it could not be done and plant foremen were almost unanimous in their objection to the cramped quarters, but as the continuous flow of production in a condensed space was undertaken it was discovered that the very compactness of it led to efficiency, just as the modern kitchenette is more efficient than the old-fashioned rambling structure.

Low Production Economy

In the department where the bodies for Lincoln-Continental and the Lincoln-Custom motor cars are assembled the problems which have been met and solved by the Tool Engineers are most in evidence. When production of a model runs over a million a year the cost of special machines and dies is small as compared to materials and labor but when, as in this case, production amounts to only a few thousand cars a year, the element of cost involved in special dies becomes staggering.

Consider for example the single operation of putting a flange on roof panels of the Lincoln-Custom model. This roof panel is the largest ever stamped from a

---

Upper and Center Pictures

Flanging Roof Panel

The author is shown here indicating the flange on the largest roof panel ever stamped from a single sheet of metal. A set of flanging dies for this panel would cost $30,000, but production amounts to only about ten cars a day. This fixture was built to hold the panel while the flange is put in by hand. In the upper picture a metal caul is seen suspended above the fixture. In the center picture this caul has been lowered to fit inside the panel and clamps have been swung over into place to hold the caul rigidly in position. Workmen then trim excess flash and hammer the flange into shape with wooden mallets. An elbow is then released in the caul and it folds up enough to lift out from under the flange. Referring again to the upper picture the completed roof panel will be seen as a workman spot-welds the gutter into place.

Lower Picture

Side Assembly Buck

On this buck a complete side assembly of the Custom model is built up. The parts are clamped into place one at a time and spot-welded into a single unit. In the extreme foreground may be seen one jaw of a welder.

single piece of metal and after stamping and trimming the lower edges must be turned in to form a flange which can be welded to the body. A set of dies to perform this operation would cost $30,000.00. Production of the model averages ten cars a day. Obviously the cost of dies would be prohibitive for so low a production schedule. A fixture was made that holds the roof panel in an inverted position while a metal collapsible caul is dropped inside. The flange is then hammered over the caul by hand—an operation which requires but a few minutes. An elbow in the center of the caul is released, the caul folds up and is lifted out from under the flange. Result is entirely satisfactory. Cost of tools about 4/5 less than if special dies had been used.

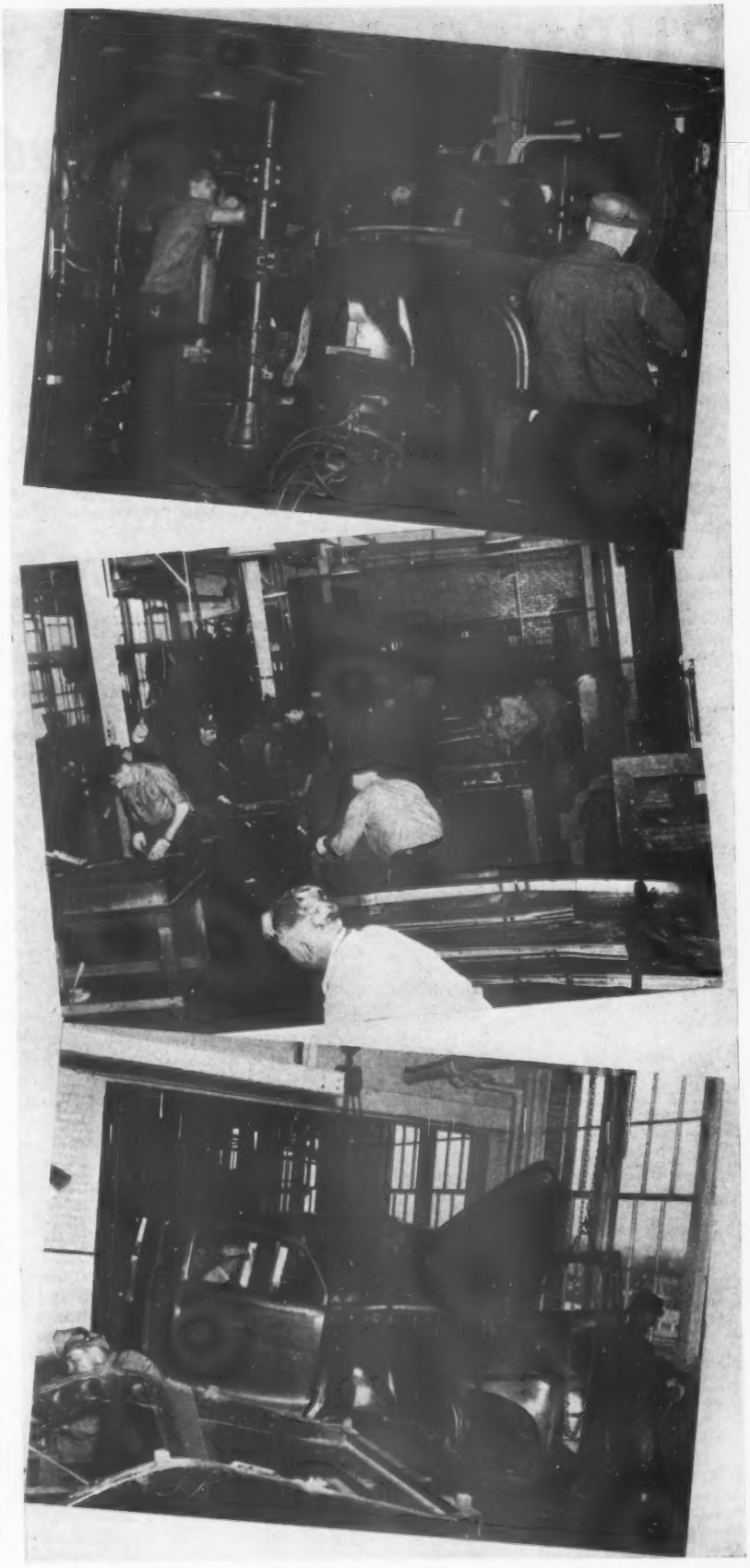
Thus economy on the low production jobs is achieved through the use of hammer blocks instead of dies.

Welded Construction

Rapid, economical assembly of the Lincoln body models is mainly accomplished through the use of separate hammer forms and sub-assembly bucks. Separate units, such as the complete rear end (sometimes called the "balloon" by body builders) and the front or cowl end of the body, are built up and welded as a single unit in these fixtures. The entire side assembly consisting of the front side cowl, all the pillars and the rear quarter are also built up by this method.

By using individual bucks for the va-

(Concluded on page 90)



Upper Picture

Final Assembly Buck

Here the complete body takes form in the final buck as roof panel and side panels join with the frame to become a single welded unit. Notice the swinging clamps on tubular stanchions designed for ease of operation and uniformity of product.

Center Picture

Finishing Touches

From the final body bucks the bodies move onto the assembly line. Here we see a group of door, deck lid and window hand forming and flanging blocks which parallel the line. Typical of the utilization of space in this plant, these parts are formed and used immediately at a neighboring point on the line.

Lower Picture

Body-in-White

The finished Body-in-White (term applied to unpainted body) comes off the assembly line. Here it is picked up by an overhead conveyor which will carry it forward to the finishing, painting, and polishing departments and then down the final assembly line.

RUBBER FORMING PADS

for Hydraulic Presses

For small lot production requiring identical parts here is a way to eliminate expensive dies.

by
J. W. DEVORSS
United States Rubber Company

THE stamping, or forming, of parts from sheet metals with metal dies is a very common practice. Where a relatively small number of identical parts are required, as in the airplane industry, or in experimental work, manufacturers have found that by using rubber in conjunction with hydraulic presses that they can effect considerable savings over the usual metal dies that have been in use for this purpose. Rubber forming pads are most applicable to industries where a relatively small number of identical parts are required and where lighter gauge metals are used because:

1. Rubber forming pads can be easily and quickly installed.
2. It is possible to form or draw many parts simultaneously.
3. Considerable savings can be effected because,
   a. It is not necessary to precisely fit and machine two or more metal parts.
   b. Usually in addition to the rubber forming pads, the only other essential part is an unmachined casting or form of the required shape. As a result tool savings of over 50% have been reported.

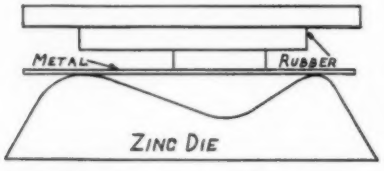


Fig. 1 — Rubber mounted on the press ram forces the sheet aluminum alloy into the die at high pressures, the part formed being smooth and free from wrinkles.

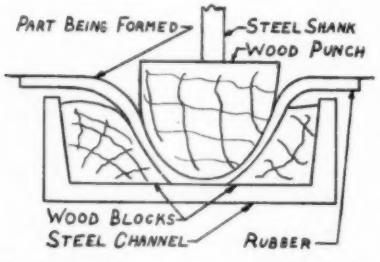


Fig. 2—Another setup uses a steel channel in which rough wood inserts are covered with a rubber pad. Parts are formed around the wood punch.

Numerous machine builders have recognized the advantages of rubber forming pads and have built hydraulic presses that require the use of rubber in either the top or bottom platens.

In one type of rubber forming pads installation, only the surface area of the rubber is exposed. The rubber is entirely enclosed in a metal box in the top platen which is the same depth as the rubber pad itself. Oftentimes the rubber slabs (which can be of various shapes and sizes) are used in the bottom platen of the press. In this case, the sheet metal is stamped, or drawn, into shape by contact with the flat forming and shearing die from above.

A tremendous saving is made possible because when using rubber forming pads the only other essential part is a form which may be an unmachined casting having the required shape. It has been found that an economical method of applying rubber forming pads is in several layers cemented together with a cold curing cement making it possible to replace the outer or working ply as it becomes abraided. As yet, no definite standard specification as to the hardness or durometer of rubber for rubber forming pads has been set up; however, all manufacturers now using rubber forming pads agree that a 60 to 75 durometer stock with a high tensile strength and good abrasion resistance gives satisfactory results, but rubber of 30 durometer is more desirable when large deflections are required for forming.

The form design in conjunction with the proper rubber compound is important to obtain economical service life from a rubber forming pad. The following design and rubber information is the result of research carried on in the laboratories of the United States Rubber Company. Because of the multiplicity of forms and shapes with which the rubber forming pads are used, the rubber may be stressed in compression, shear and tension. Inasmuch as the rubber is primarily in compression, the following data can be intelligently applied to the design of the forms and pads to insure satisfactory service.

Rubber is practically incompressible and when pressure is applied it will flow similarly to a liquid. With equal pressure the amount of flow will be dependent upon the area of rubber free to bulge so that it is necessary to determine a value for this characteristic. This has been set-up as an area ratio which is explained as follows:

The area of one loaded face of a rubber slab is called "load bearing area" or "top area". The area of the unconfined edges or unconfined surfaces of a slab is known as "bulge area." The load bearing area of any slab divided by the bulge area is known as the "area ratio." For example, a slab 2" square with unconfined edges only and 1" thick has a load bearing area of 4 square inches and a bulge area of 2" x 1" x 4 equal to 8 square inches. The area ratio is 4 divided by 8 equal to ½. A slab of the same thickness, that is, 1", but 4" square has a load bearing area of 16 square inches, and a bulge area of 4" x 1" x 4 or 16 square inches, and an area ratio of 16 divided by 16 equalling 1. Data on load bearing and bulge areas are given for various sizes of square slabs in Table 2.

Another example in determining an area ratio would be a slab which has all surfaces confined except the face which

TABLE NO. 1

	1	2	3	4	5
U. S. Rubber Compound No.	3825	3773	3899	3709	8705
Durometer Hardness	30	40	50	60	70
Tensile Strength	3000	3000	3800	3000	3000
Ultimate Elongation Per Cent	700	625	625	500	600
Specific Gravity	0.95	1.32	1.12	1.18	1.26

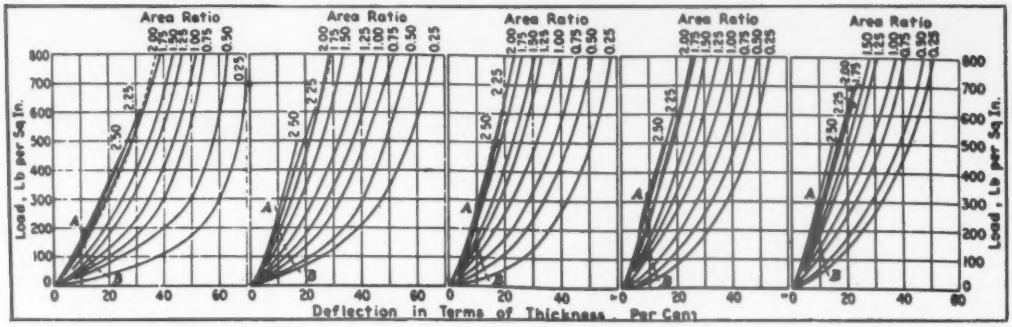


FIGURE 4

is pressed against an object with less area than the face of the rubber forming pad. Assume a rubber slab with a face of 4 inches square or an area of 16 square inches 1" thick with all surfaces confined except the face which is pressing on an object that is 2" square or has an area of 4 square inches. In this case the load bearing area is the area of the object, or 4 square inches, and the bulge area is that part of the surface which is *not* confined or 16 sq. in. minus 4 sq. in. or 12 square inches. The area ratio therefore is $4 \div 12 = .33$. This area ratio will determine the flow condition of the rubber forming pad exactly as in the example of the slab with unconfined edges given above. Each area ratio represents a different flow condition for the rubber and must be determined for the specific operating conditions. It can be seen that for large deflections a soft compound as 3825 will flow easier than a hard one like 8705.

The slabs of identical rubber compound having equal area ratios and carrying equal unit loads deflect the same percentage of their respective thickness. Load-deflection data for the five typical compounds, whose physical properties are given in Table 1, are presented in Figure 3 and Figure 4. All slabs from which the data were obtained were square. Calculations for the deflection of slabs that do not have square load bearing areas have repeatedly been found to correspond with these curves. Some discrepancies are apparent, particularly between curves for higher area ratios. These are due to slippage of the pressure faces of the slab. This slippage might be overcome by bonding the slab to a steel plate, but since this is frequently not done in practice, the data are presented just as obtained. The portion of curves to the left of line A-B are the part of the curves that would be

TABLE NO. 2

Load-bearing and Bulge Areas and Area Ratio for Square Slabs 1 In. Thick and Various Lengths of Side

Length of side, in.	Load-bearing area, sq. in.	Bulge area, sq. in.	Area ratio
1	1	4	0.25
2	4	8	0.50
3	9	12	0.75
4	16	16	1.00
5	25	20	1.25
6	36	24	1.50
7	49	28	1.75
8	64	32	2.00
9	81	36	2.25
10	100	40	2.50

recommended for the design of a structural rubber part expected to be in continuous service for several years.

The economical service life of a rubber forming pad will be determined by the savings effected by its use. It may be necessary to use deflections and loads larger than those shown in Figure 3. In this case the life of the rubber pad will be shorter than if loads and deflections as given in Figure 3 are adhered to. However, the service life should still be satisfactory and economical. Figure 4 shows the load deflection characteristics for the same rubber stocks as Figure 3 extended to 800 lbs. per sq. in. and 70 percent deflection. Because of the varying types of dies and savings effected by the use of rubber forming pads, it is impossible to definitely draw a line on the load deflection curves which would determine the economical service life of the rubber. This point will have to be determined by experiment by the user for his particular conditions. The foregoing information should be very beneficial in determining the maximum economical capacity of the rubber and in choosing the proper rubber compound.

To illustrate the use of these curves, take a specific example—assume a rubber forming pad with an area ratio of 1, the various compounds will have the following characteristics:

Compound No.	Recom. unit loadings and deflections for continuous services for period of several years.
3825	87 lb./sq. in.—defl. of 13.8% of thickness
3773	105 lb./sq. in.—defl. of 12.5% of thickness
3899	125 lb./sq. in.—defl. of 11.2% of thickness
3709	132 lb./sq. in.—defl. of 10.8% of thickness
8705	160 lb./sq. in.—defl. of 10.5% of thickness

The characteristics shown in the preceding table are for continuous service of several years. It is to be borne in mind that shorter but more than likely satisfactory and economical service will be obtained with greater deflections and loads.

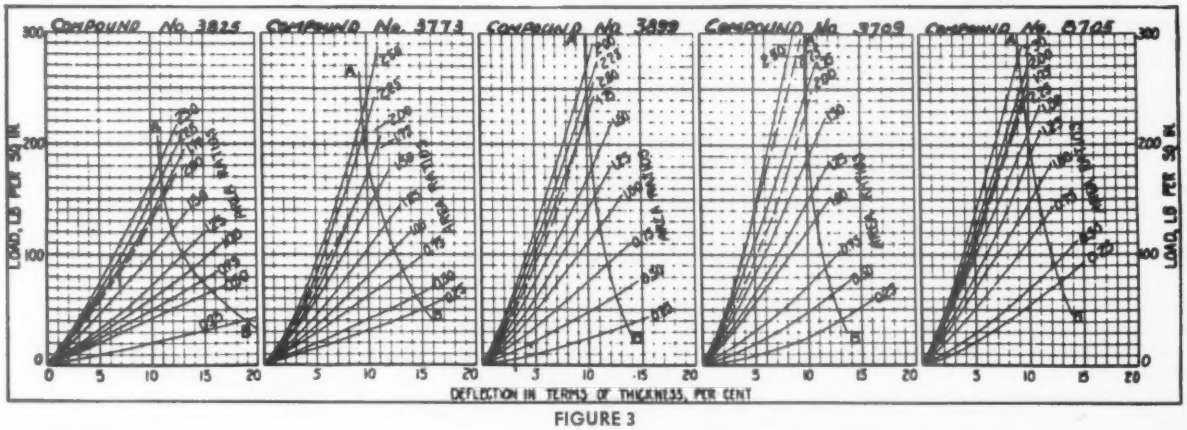


FIGURE 3

WHAT INDUSTRY can Learn from EUROPE

by
WHITING WILLIAMS
Industrial Consultant

ONE of the great difficulties, I think, in this particular time of ours today is that nearly every one of us assumes that, without any study at all, without any attempt to take a share of the other man's experience, we know perfectly well what is in the minds of other human beings so we don't need to try to get a taste of his experience in order to find out what is in his mind. I have come to have a very good respect for the need of knowing the other fellow's experience in order to know what is in his mind.

I found myself back in 1918, pitch forked rather suddenly out of social work into the job of Director of Personnel. A few months later I woke up to the fact that I was not doing so well. They finally proposed I should go out and enjoy a six or seven months' leave of absence by doing the work and living the life of a working man. I have always had to answer the question as to whether I did really fool any working men into accepting me as one of them. I certainly did in those first seven months of living as a coal miner, in the steel plants, as a laborer and hobo and what not. In 1919, only one man saw through my disguise. I felt that he wasn't playing quite fair because at the moment he was intoxicated. After he told me all about myself most amazingly, he topped it off, "But there is something wrong here stranger. Either you have committed some serious crime and are a fugitive from justice or else you are a victim of some disgraceful secret sin or you would not be working in this damn town at $4.00 a day." I also felt some chagrin at being accepted as casually as I was, when in 1922 I found it necessary to work as a strike breaker to get some stories for *Colliers*—stories which, by the way, got me the friendship of both the capitalists and labor leaders because they felt I did tell the story fairly. I went in that connection, down and took my place at a labor gang boarding house in a little town in Ohio where I thought in view of a very inadequate disguise everybody would feel I was out of place, but where on the contrary, everybody seemed to think I was lucky to get a job at 47 cents an hour pushing a truck in the railway roundhouse.

I also had the same luck when in the summer of 1920 I went out and had the same experience over in England and was accepted fairly well by the working men there. Still later in France. Still later in the mines of the Saar and of the valleys in Germany I felt I got at least to the skin of the fellow workers because every day after we did our work down below ground we would come up and take our shower bath all at the same time, crowding together six or eight in a shower bath, meant only for three or four, and everybody, being good Christians, would wash every back near him as credit towards somebody washing his own back. I found not so much that I was worried about the difficulty of getting close to the workers, so much as the danger of getting too close. I found that particularly true one time in Russia when I was arrested and when I tried to walk through a picket line in a strike back in America in 1922 when working for *Colliers*.

As a result of these various efforts to get at the experience of the workers as the key to the workers' minds, I am willing to say that one big difference between the worker here in this country and the worker abroad has a very direct bearing on the thing that brings you here tonight. Namely, the fact that in Europe, as everywhere, I have seen the worker enjoy the benefit of much less machinery, many, many fewer labor saving tools than we have here. Every working man is expected to work much harder and I was grieved to notice that whereas in America practically all my companions everywhere had enjoyed the use of canvas gloves made cheaply by machinery that you have provided, practically no workers from top to bottom that I have ever seen in Europe use gloves of any sort. Partly also, the difficulty comes from the way in which Europe has had a much stingier equipment given it by nature. In other words, I found that whereas in most of the mines in this country you are apt to find a five or six foot seam and I have been in West Virginia where I have looked for miles and miles and told that a five foot seam was the least of the thickness of coal that stretched over 50 or 60 miles up to the Ohio River. In France I have worked in a very narrow seam that stood exactly up on end so that the coal from my companions above me went down the back of my neck and where also, I

saw hundreds and hundreds of men taking out the coal from an 18 inch seam that was so narrow that before they could go to work they had to take away the bottom and roof to get elbow room. That means, therefore, that you are likely to have a much lower living level there in all of those countries than over here.

The difference between the level of living in Europe as compared with the worker in America is the difference between the bicycle as a luxury of transportation as compared with the automobile. But the most outstanding difference, of course, is that practically in all of those countries there exists a working class. Everywhere there is the assumption that every working man will be expected to die as he lives—as a member of the working class. It is practically unheard of that a man should be born into the working class and end up in the manager class. I have in mind, for instance, there in the Saar during the time the German Government ran the mines before the League of Nations took them over after the war, there existed this situation and typical of the difference between Europe and America. No boy could hope to ever become as much as a foreman in the mines of the Saar Valley operated by the German Government unless he passed successfully a certain examination at the age of fourteen. But he could not be expected even to take that examination, to say nothing of passing it, unless at the age of ten he began a certain course of study calculated to prepare a boy for the taking of that examination. But he could not expect to start that course at the age of ten unless his father had accumulated enough additional income in order to pay the extra tuition. That meant that if a boy in the mines, a son of a miner, passed this switch at the age of ten and did not take it then it was absolutely certain that the rest of his whole life he could never hope to rise above the level of a coal miner. So the worry of every father in Europe is not that his son shall start where he leaves off but that he shall be so lucky that he may be enabled, with the help of man and of God, to occupy his father's shoes.

In England I used to ask the workers why they did not save up money and buy an automobile or this, that and the other thing. I was always told, 'You see sir, working class we are. We aren't supposed to do that sort of thing." That has a sole advantage that it does make it possible for them to have a higher type of labor leader, I should say, than here but for a reason that very few of the observers have noticed: namely, if a man starts as a labor leader over there in some small town and then should be offered by any chance a position on account of his leadership in some management, he would be marked yellow for the rest of his life, as a traitor to his class—a man who would go back on his fellow workers. At the same time the Unions are not as strong as generally supposed—at least since the great strike of 1926 there in Great Britain —and the Union has only recently come back to the strength of about 35%. As we know, the Unions in France and Italy and Russia have gone the way of complete destruction. But the strength of those Unions, both in England and in Sweden, has been such that it has caused within the last few years the formation of employer Unions which are today just as strong as the Unions of employees. In Sweden, for instance, if you are a member of the employers Union and have a strike, in spite of the fact that you have followed all the rules and regulations laid down for you by the organization, your strike losses are paid up to you at so much per day per striker and one employer told me he worried more about the possibility of getting in wrong with his Union of employers than he did from the possibility of getting in wrong with his Union of workers. Now that means, however, that both of these groups, organized capital and organized labor, are given a respect and a freedom by Government such as we do not know here. Greatly to everyone's surprise, over there there are no laws for compulsory arbitration and there is practically nothing in either of these countries as to the matter of minimum wages or maximum hours. The Government shows the utmost impartiality and has the utmost respect for the ability of labor and of capital to get together and work the thing out in terms of their understanding through long experience of the technicalities involved.

WHITING WILLIAMS

is a man who can write with authority about conditions in Europe and how they compare with America because he has worked as a laboring man in practically every country of importance in the world.

I say it is too bad we have not learned from Europe what we should have learned in the way of helping capital and labor to sit down and talk things over on a reasonable basis instead of assuming that every employer is going to do nothing at all in cooperating with the employees until he is forced to do so by that, this and the other law.

It is more serious that we have been learning from Europe exactly the last thing that we should have learned from Europe. Namely, that we should endeavor to build our entire employment, or rather employee and employer relations problem, upon the assumption of a working class in America. It seems to be exactly what has been done. I am quite sure that as I compare my experience among the workers in this country with the experiences of workers over there, that you have a working class over there because the working man is expected to be interested in two things and only two things. One is that he shall get a certain number of cents per hour. The other is that he shall be given, by one means or another, a certain minimum of security. Everybody says, "Yes, what is the matter with that?" Most of the high brows in America would say, "What are you talking about? Why isn't that what the American worker wants?" Millions of our citizens—the American working man—wants more than the working man of Europe. The fact is, the working man of Europe is limited to money and a certain minimum security—not at all an abundance of security. That is the reason why he is a member of the working class. The reason why the American worker still continues to call himself an individual is because he wants three things out of his job: money, a minimum of security, and a maximum of opportunity. A maximum of opportunity to rise in the scale. To start here and get that job there and higher and higher and finally perhaps die as one of the leading industrialists—a most important, most honored citizen of the entire country. In other words, I have found that we are making the mistake of Europeanizing our working problem here and at the same time Dollarizing it. Our laws and all sort of things recently have been built on the idea, the crux, that 95% of the importance of the labor problem is nothing but the money, nothing but dollars. But the American working man wants to find these three things in his work—a certain amount of money per hour, a platform of self respect, a platform of security, but he also wants that job to represent the bottom or some place on a ladder of opportunity and, as you all know, of course, every plant, like every office and factory represents a whole scale of social statuses with everybody in the world in those particular jobs feeling that this job is that much more important than that job, not because of money but because of the amount of skill required, the years of training demanded, the amount of responsibility represented and a thousand and one things that make it so. I have had jobs that I thought were not very important, did not represent much of a promotion because they represented only two cents an hour more but when, to my surprise, everybody was kowtowing to me as a man that had his foot on the ladder. In that whole equation is figured all sorts of things until finally everybody realizes that the conductor of a train is that much better than the brakeman and the brakeman that much better than the hustler in the roundhouse and so on. The whole working

world is made up of statuses from inside the plant, all of which are copied in the terms of social status and recognized outside because the most important thing I know about the workers is that they are willing to say not only is that job that much more important than this job but the man that holds that job is that much more important as a citizen than the man that holds this job.

We talk about democracy as though it was established the moment we voted to give men the ballot box. I tell you the biggest single factor in making America the democracy that it has been is the fact that everybody has found in his work in America, a ladder by which he could grow. It is a caste system but it is a caste system which through its fluidity and elasticity, makes it possible for a man, as the result of his own effort, to rise and make sure he does not stay in the appointed niche into which he was born, as is the situation in Europe. I cannot make that plainer than perhaps by repeating what I have been telling about these last few years. Namely, the way in which this caste system—this fluid caste system which has made most democracies—in this country starts with the Chairman of the Board, makes him more important than the President and goes down through the Superintendent, down through the foreman, down through the machinist, the tool designer and so forth down to the sweeper and so on and then continues down still further.

I nearly got beaten up one night when I insulted a hobo by taking him for a tramp. He finally said, "You don't suppose I would be a tramp? We hobos are itinerant laborers. We have to get to one part of the country at one season, at another part in another season and if we don't get there the crops go to waste, millions of dollars are lost and the country goes to hell. We have to take a train. A tramp walks from job to job. But," he said, "don't hurt the feelings of a tramp by taking him for a bum. A bum is one who neither walks nor rides for work. Don't stand the chance of taking a bum for a weasel or a jungle buzzard because no bum would be as low down as a jungle buzzard. A jungle buzzard expects to eat out of the mulligan stew collected by the others without contributing anything thereto and nobody has a use for a low down jungle buzzard. But don't hurt this buzzard by saying he is as low down as a mission stiff. He is too low down. He expects to make his living by living 3 or 4 weeks at a time at religious missions. Good food and good beds, simply by fooling the keeper into feeling he has saved another soul for Christ. Everybody looks down on a low down mission stiff but don't hurt the mission stiff by saying he is a lush driver." He is the lowest one you can write about. He makes his living by exploiting or robbing drunks. The point is at every level in the United States you expect to find men giving their certification of their right to think well of themselves as human beings and citizens—not because of the women they marry or the money they earn or the house they live in but by their job. This is my job. This is the way I earn my living. And it is assumed that, therefore, when you tell what a man's job is, you have a pretty good representation of the kind of a person he is, the kind of ability he has, the kind of character and morality he has at that moment.

The big thing that has made America great, this thing we must hold on to for America's future, is that everybody assumes we are all on our way, that that ladder can be climbed by the individual who is willing to pay the price.

Now the big thing is that just recently we have been accepting an entirely different philosophy. A philosophy built upon the importance of the dollar alone. It is the only thing that makes men willing to work and we have been adopting the European idea that, this ladder is a wicked thing—the differential between jobs ought to be done away with. I cannot help but say, without meaning any aspersions, that the C.I.O., it seems to me, has had its tremendous growth largely as a result of the fact that millions of our fellow citizens have had the experience of depression, the experience of being out of a job, the experience of feeling they would be willing to pay any price for a firmer hold upon their job.

That means that the C.I.O., The Industrial Union, tends to work in the direction of the working class because it puts the emphasis not upon opportunity but upon security. On the class instead of the individual. If John Lewis were here, he would say, "We want to raise the whole level of the workers, but we don't believe in the individual going up by himself." All of that has a bearing on the shortage of labor because whereas some of the A. F. of L. Unions tend to set up a monopoly of their particular skills which have made it difficult to train the proper number of apprentices, at the same time, the C.I.O. Industrial Union has worked in very much the same direction by discouraging the unskilled from trying to become skilled, as the result of trying in general to lower the differentials which acted as a lure for the unskilled to go up higher.

The funny thing of it is that at the same moment we have been working in that direction away from the differentials, Russia, as a result of its experience in the solution of its problem for building up of an industry, has been proceding in exactly the opposite direction. Some years ago when I was there I was surprised to find they had gone to piece work, because piece work is against the philosophy of Communism. But they were then at that time, in 1928, saying, "We don't believe in differential. We are different from the capitalist's country, we are making sure there is only one class and that is the working man. We don't recognize these differentials that set the skilled man off by himself." But in 1933 when I went back there, 5 years later, Stalin had seen the necessity of changing that if he was going to develop strong Russian industry with the result that today in Russia you have a larger differential between the skilled man and the unskilled man in terms both in the number of rubles paid per hour and also in terms of honor and kowtowing and recognition paid to skilled men. There is a greater differential in Russia today than in any country in the world just because they have seen the necessity of having the thing, away from which today we are proceeding in America.

I think one of the most important investments made in America—it still continues to be made but how long I don't know—is the hundreds of millions of dollars spent every year by working men in tuition for night study for the purpose of enjoying that differentiation, that increased sense of self importance, that increased honor and status that America up until recently had been willing to pay to the man of skill and the man of responsibility. But nowadays we are being told by many people that that is all wrong. They should not expect that. They should consider themselves working men like all the others. That is bad enough in the way of hurting the future of the American worker and is making it difficult to get workers of skill at this time when we need them. Still worse than that though, I think we have been taking a leaf out of Europe's book and learning something we should not learn, by accepting all the explanations we are given of what is the problem between the employer and the employee. We are being told by the labor leaders and also by a great many intelligent writers of books that the difference between the working man and the employer represents a great many large complex class historic issues and that we cannot expect to have peace between working men and employers until those things are solved. That is not my experience. I find generally that the crux of the labor problem *is* likely to be found in a lot of little things, little grievances that have gone on year after year without being attended to, in a way in which everybody is unhappy because his feelings have been hurt.

I have in mind my experience in a mine in the Rhonda Valley where they were staging a sitdown, although it was called a strike of folded arms. Five hundred men in Wales went down every morning at the regular time and came out every night at the regular time but knowing if we set hands to tools we would be beaten up by the Communists in charge of the Committee. So, we spent the time singing radical songs. One was about the blood red flag of revolution. A Welchman told

Materials in Process

". . . and one is of flesh and blood."

me, "The time will come when we will pin that red flag to the highest tower of Parliament." One day I got mad and blew off to the Communists. "My feet are wet already because of the mud here and I am wet because there is no shelter where we have to stand every morning. Why? You have got to go to the employer and ask him to put down gravel and build a shelter." This leader gave me a pretty good insight of the labor problem as he went on to reply, "Many's the time we have gone to the marster with exactly that same request but always do the marster say to us, trouble makers. Bolsheviks, Communists, we will have naught to do with you, out with you.' " Then he added a word I wished other employers could have heard. He went on to say ,"If only the marster here some years back had seen fit to see us leaders not so much the trouble makers as the trouble finders it would be a better pit to work in here and now." Those employers could make the same mistakes they are making here today and have in the last few years. They could have said, "They are paying money to Communist leaders, it must mean the employes have become Communists themselves." That would have been clear off the track because the old boys would get me off in the corner, some fine old Welchman, and give me the low down and say, "These Bolshees, you understand, they do go too far with their schemes. I would we must have order and law. British citizens we are. We believe in law and order. But, after all, these Bolshees do be the mouthpiece of us all for all of us be fair unhappy. Unhappy not about the capitalist's system or the Towers of the Parliament House, unhappy about the little things which made management careless." None understands why management allows to interfere with those prides, those assurances and satisfactions which every worker in the world wants to find in his daily work, with the result that when somebody came along and said, "I will take care of those grievances, I will fix those dissatisfactions up, you follow me," if you are a worker you don't say, "Wait a minute, are you a Presbyterian or Communist or a Socialist?" No. You say, "By, God, if you are willing to take the chance and go to the boss and fix those up, here is my money."

The start of many labor troubles is the fear that comes out of the experience of men, as to their holding on to their job and enjoyment, when nobody among the employers is willing to understand it. A friend of mine goes to a big chief of the C.I.O. and asked how it was they have been able to organize in all sorts of industries so quickly. He said, "Easy. We

sent out investigators first of all to ask people what are the troubles and things that interfere with their satisfaction in that particular industry and we come back and sort them all and find finally that there are five of them that were mentioned by a larger number of workers in this industry. Then I give the five to the agitators and organizers. We don't care what they are. They may be irregular work, bad differential, or bad this or that. We don't give a rap what they are. We tell them to go out and tell all the workers in the industry that if they will give $1 a month they will never have to worry about those five grievances and they will have satisfaction in their work."

Now that means that today, in my opinion, we have embodied in laws that will be very hard to change, a whole lot of things which represent the Europeanization, the Dollarization of the labor problem. The National Labor Relations Board seems to me to start with these assumptions, first, that the only thing that differentiates the employer from the employee is the division of loot, the money. The only way in which a fair division of loot can be arranged is for the organization of a working class on the one side to fight against the employer class on a fair footing. The only way they can get that finally worked out is through a conflict, a fight between those two. The government can step in, therefore, and say, "We will be the referee of that fight." That sounds perfectly natural. We are all used to that now but that is exactly the same list of assumptions on which Marx laid down his proposition that the class was an absolute necessity if the working man was to have a fair deal. I am not opposed to collective bargaining. I am opposed to the thought that it must be a part of continuous conflict. In my opinion, all of this learning from Europe about the working class and all of this learning from Europe that the only thing the worker wants is a certain amount of money, is the reason why we have today a whole set of arrangements for relief. I am perfectly willing to say that we should have a W.P.A. and such things that are absolutely indispensable emergency palliatives. We must have Social Security and Unemployment Compensation. That is fine. I am with anybody that will look upon those things as palliatives but I will fight to the last inch against the man that assumes they represent permanent solutions of the problem. And yet there are millions that believe they are partial solutions because they say if a man is getting $30 a week by the sweat of his brow, then if they can arrange to pay him $15 by relief or W.P.A., they have solved the problem 50%. But there isn't a worker in the whole world who doesn't know that is false. Every worker knows that there are certain spiritual satisfactions that come to a man that is on a job, that is apart from the matter of money and we are, therefore, risking the whole future, in my opinion, of the American worker when we begin to assume that the matter of solving labor problems is nothing but a matter of hoping that the payers of taxes will so long hold up that we can manage year after year after year to pay them the amount of money that represents at least 50% or 60 or 75% of that problem.

The hardest job we human beings have in this world is the job of continuing day after day to believe in ourselves. There has nothing yet ever been invented that could help a man believe in himself, to make him say, "I am important, look at my job. That is what keeps me going year after year." Jobs are things that have a spiritual significance and yet it seems to me, during the last eight years we have missed that. We talk of unemployment as though it was a matter of economical things, that we merely lose the buying power of those people. The problem is one of spirit. We must maintain the differential.

Speaker Williams
"America is finished unless . . ."

Over there, I found that French engineers as foremen and managers were doing a grand job of handling the German workers and German miners. They felt the Frenchmen were treating them better than they had ever been treated before. I went to a French engineer to find out why. They told me why. They said, "You see in a coal mine, one tool is of steel and one of flesh and blood. We are taught in school where we learn to be engineers that as long as eighty per cent of the cost belongs in the flesh and blood tool we cannot pass it on to any foreman or intermediary so we spend the first two days of every working week down below ground talking face to face with this tool, this human being, this German miner." I might be working with the German coal miner and along would come one of the big shots and say, "How do you do." And then he would do a thing that delighted them. They would always start talking about the tools. They would say, "Are you being given good temper tools by the Company? Are your tools and machines all right?" because they knew that tools hurt the pride of people. Bad tools hurt the pride of more workers than can be mentioned in a moment. I have been in places where the Company was spending thousands and thousands of dollars trying to get the good will and respect of the workers but losing it because the worker in the place was convinced the management did not know the value of a good tool and no worker in the world can respect the management that does not have his respect for a good tool.

So I would say contact is the thing that will bring the understanding, the cooperation that is necessary if we are going to meet the demands of the present time and I leave with you there in conclusion the word of my old friend, Evans Pugh, a repairman in the Rhonda Valley. It shows the necessity of contact and also of appreciation and also the necessity of work because he had noticed a change. The under manager, after being a Captain in the war—had been hard boiled before he went off to war—but when he came back he put in operation a different way of management in the pit. The reason that was done was that he had been a Captain in a Company made up of 100 miners out of his own pit with the result that one night the Communists were trying to stir things up and Evans Pugh said, "Well, yesterday, you understand, the under manager toured the pit and he said, 'That do be a first class job you have done.' I do say to him, 'Mr. Undermanager, in 43 year, in 43 year of working in the pit that do be the first time any Company man do say to me the kindly word about me job.'" Then he went on to say, "I now mean it, every man do more for a kindly word and he will work his bloody guts out but no dog behave well for a man with a whip and every man with a feeling and sensibility do know that for him the whip of the tongue and the lash of the tongue have been worse than a whip on any dog. Man must have a chance to show himself a man, mustn't he?"

I say to you gentlemen. I beg of you to understand that this country is finished, that we will not be able to resist the Hitlers, unless we understand that men in America can grow and exert spiritual strength until they have a chance on their job to show what manner of men they are. That is impossible unless we pledge ourselves that men can make not only money and self respect, but a chance to grow, in the honor of their fellow citizens.

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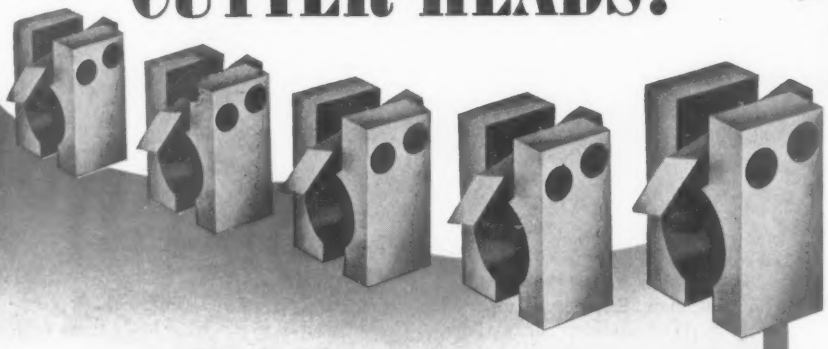

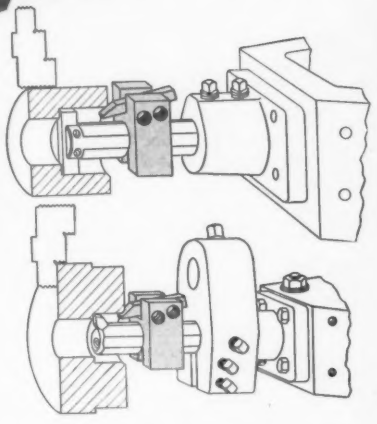

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M-1761	M-1781	¾"	¼ x ¼	
M-1762	M-1782	1"	⅜ x ⅜	
M-1763	M-1783	1¼"	⅜ x ⅜	
M-1764	M-1784	1½"	½ x ½	
M-1765	M-1785	1¾"	½ x ½	Combination Set "B"
M-1766	M-1786	2"	⅝ x ⅝	
M-1767	M-1787	2½"	¾ x ¾	
M-1768	M-1788	3"	¾ x ¾	

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IT'S NEW

Brief Reports on the very latest developments—New Equipment, materials, and processes.

Michigan Tool Hob Checking Fixture

Michigan Tool
Hob Checking Fixture (58)

A new hob-checking fixture designed for routine checking of hobs after sharpening has been announced by Michigan Tool Company, 7171 E. McNichols Road, Detroit, Mich. The fixture will check hobs for radial sharpening, spacing of flutes and runout of hubs. It can also be used for checking single form relieved cutters or form gashing cutters for sharpening and spacing.

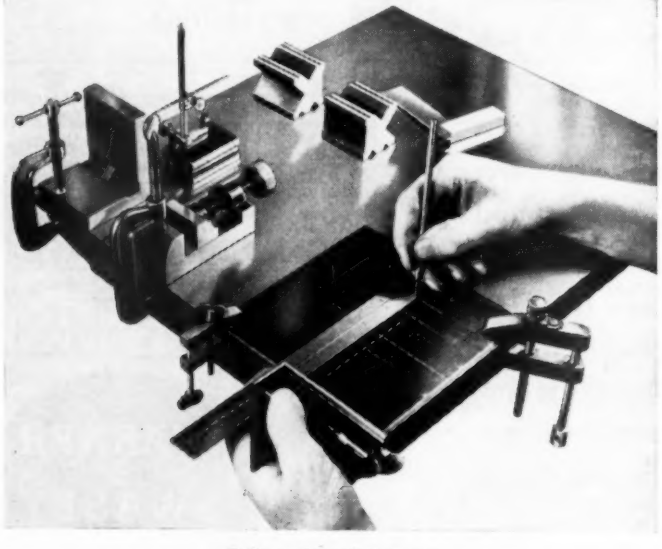
The fixture is universal in character and has a maximum capacity of twelve inch diameter and fifteen inches between centers. The dial indicator can be moved in both horizontal and vertical planes, while the head carrying the indicator can be moved parallel to the centers for checking at either end of a long hob. The up and down movement of the indicator is accomplished by means of a micrometer barrel having a graduated dial to permit setting to any desired exact amount.

Ruthman
Gusher Coolant Pumps (59)

The Ruthman Machinery Company has announced the addition of a line of smaller pumps, the Model P-3, made in various types and capacities which is especially adapted to small lathes, grinders, honing and lapping machines, automatic lathes and to larger machines requiring only a moderate volume of coolant.

The new P-3 Model is of the same general design and construction as the larger Gusher Coolant Pumps. The essential features are: A built-in motor, rugged vertical shaft suspended on precision ball bearings, double suction intake which provides a balanced impeller, and special constructional details which permit simple and easy installation on both old and new machine tools.

Data and dimension sheets are available and will be sent to interested readers. Here is a small line of high grade Coolant Pumps priced to bring them within the range of users and manufacturers of smaller machine tools.



Delta surface plate in use.

Delta
Surface Plates (60)

Two new surface plates are offered by the Delta Manufacturing Company, 637 E. Vienna Avenue, Milwaukee, Wisconsin. Previously the choice has lain between high priced, hand-scraped precision plates or else more or less make shift affairs. To fill the gap these new surface plates that give the user satisfaction at a fraction of the cost of hand-scraped plates.

These plates provide a true surface and are made of a properly ribbed casting to insure the surface remaining true. The plates measure 15″ x 8″ x 3″ and 16″ x 22″ x 3″.

Standard
Buffing & Polishing (61)

An Infinitely Variable Speed Buffing and Polishing Machine has been developed by the Standard Electrical Tool Company, 1933 W. 8th Street, Cincinnati, Ohio. The correct speed for each operation can always be obtained, using any size or type wheel. Further, longer wheel life and more efficient production is insured, with an additional saving being reflected in that worn wheels no longer have to be discarded.

The change in speed is accomplished quickly and easily, merely by turning hand wheel conveniently located at top of machine. Each change of spindle speed is shown in revolutions per minute on the indicating dial at front, and while the full speed range is 1000 RPM to 3500 RPM, the Speed Changer can be set for any intermediate speed range desired.

(Continued on following page)

TO HELP YOU

HELP AMERICA

PREPARE!

The facilities of the "World's Greatest Toolmakers" are geared to supply the Precision Tools essential for American Defence Production.

ARMS ARE PRECISION PRODUCTS

... the men who make them will produce them faster and better if production and inspection measurements are made with fine precision tools like this Starrett Vernier Caliper. Sharp, clean-cut, easy-reading graduations; firm yet smoothly fitting slides; perfect workmanship, finish and proper balance — all insure dependable accuracy.

PLANES, SHIPS, TANKS START HERE

In the drafting room, in the tool room, in the shop, on the inspection bench — this Starrett Universal Bevel Protractor No. 359 has a thousand uses. Entire circle graduated to degrees. Fitted with vernier, centralized fine adjustment device and acute angle attachment.

SIDE ARM FOR CRAFTSMEN

Symbol of safe, sure accuracy, Starrett Micrometers are indispensable equipment for every skilled craftsman. The complete line of Starrett Micrometers includes many models designed for aircraft, ordnance and similar exacting work.

KEY TO THE NATION'S TOOL CRIB

Complete Starrett Catalog No. 26-T lists over 3500 Precision Tools, Dial Indicators, Steel Tapes, Rules, Hacksaws, Ground Flat Stock, etc. If you buy tools, be sure you have a copy. Write for one.

THE L. S. STARRETT CO.
ATHOL, MASSACHUSETTS U. S. A.

★ AVAILABLE THROUGH ALL LEADING SUPPLY HOUSES ★

STARRETT TOOLS

IT'S NEW

(Continued from preceding page)

Drafto
New Models (62)

New models of Drafto are announced by the Drafto Company, 10 Walnut Street, Cochranton, Pa. This portable drawing machine will have the same general specifications as the old models except that the protractor will be made to take the same type of scales that are used universally in drawing rooms. The protractor is made of stainless steel and is equipped with a vernier for easy reading. In addition the protractor is equipped with a latch spring which latches mechanically at 0°, 30°, 60°, and 90°, making it possible to index the protractor quickly to any one of these points.

Kennametal
New Tool Material (63)

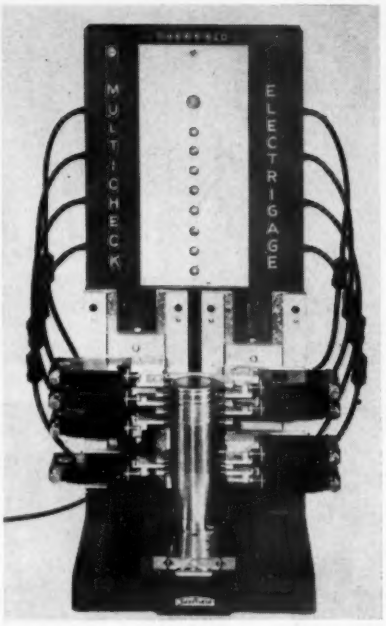
A straight tungsten carbide grade of Kennametal which is said to be approximately 15% stronger than any other tungsten carbide of the same hardness, has just been announced by McKenna Metals Company, 600 Lloyd Avenue, Latrobe, Pa.

New Kennametal tool in operation.

Known as Kennametal grade K4, this new carbide tool material has a hardness of 92.0 Rockwell A and strength of 223,000 lbs. per sq. in. (transverse rupture test). The increased hardness and strength of Kennametal K4 is said to be a result of improved methods of carbide manufacture developed by the company. K4 has the same thermal conductivity as other tungsten carbide tool materials. The increased strength is particularly desirable when taking rough cuts or interrupted cuts on hard metals.

Ideal
Live Center (64)

The Ideal Commutator Dresser Co., 4152 Park Avenue, Sycamore, Ill., offers a new low cost tool that is said to cut



production costs on lathes, millers, grinders, etc. The live center rotates with work on precision ball and taper roller bearings. An exclusive feature is the three different center pieces or inserts which are available. They include a male insert for work already centered, a plain female insert for uncentered work, and a female insert with three raised lands for uncentered work having a flat or burred keyway. All parts are hardened and ground.

Sheffield
Multicheck Electrigage (65)

The Sheffield Multicheck Electrigage, product of the Sheffield Gage Corporation, 1529 East Third Street, Dayton, Ohio, is a precision instrument for the rapid inspection of mass production parts having several critical dimensions.

Measurements of length, diameter, and depth are flashed simultaneously on a control board by means of colored signal lights as the part being inspected is placed in gaging position. As individual gaging head is incorporated for each dimension to be checked and each head actuates a signal light.

In addition to the individual signal lights (one for each measurement) this gage has a master signal light which integrates all measurements. When the master signal shows white, all dimensions are within tolerance. When it shows red, the individual signal port lights are observed in order to determine which dimension or dimensions are incorrect and whether they are plus or minus.

Hardinge
Precision Centers (66)

Entirely new index centers are offered by Hardinge Brothers, Inc., for their precision tool-room milling machine. The design of the index centers is based on experienced needs and are said to incorporate sturdy construction, large collet capacity and operation features to speed up production in the milling of precision parts.

The compact box-like construction minimizes the overall height to act as a sturdy base for the spindle section. The spindle is mounted in super-precision pre-loaded ball bearings and, with the same support for the machine spindle, a combination is made which is said to give the greatest degree of accuracy and rigidity for milling operations.

Anti-friction bearings are provided as a support for all gears and shafts. The spindle section has large swivel bearings and positive locks to secure angular settings. The spindle proper has a secure lock which is applied after an indexed position is completed.

South Bend
Tool Room Lathe (67)

A new Series S Tool Room Lathe announced by the South Bend Lathe Works, 925 East Madison Street, South Bend, Ind., has a number of time saving features. A convenient arrangement of controls saves time and effort, reducing operator fatigue and assuring maximum production, according to the announcement of the company. Large diameter hand wheels facilitate precision adjustments and micrometer collars have large, clear cut graduations.

South Bend Tool Room Lathe

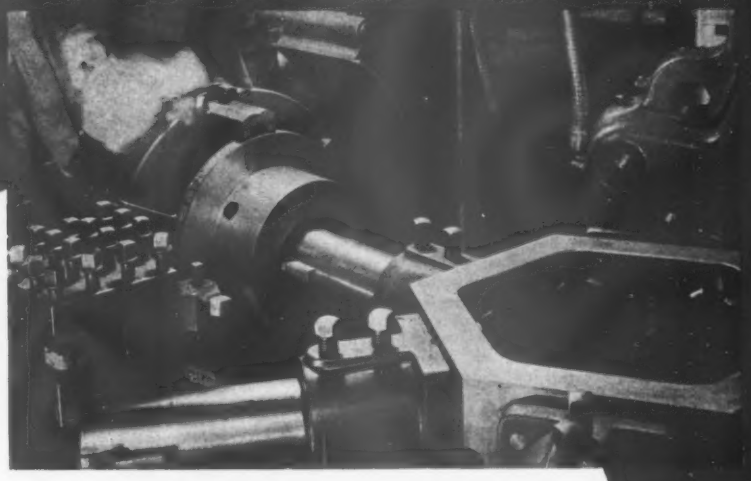
A telescopic taper attachment is permanently attached to the lathe carriage and is always ready for use, regardless of the position of the carriage. To engage the taper attachment it is only necessary to tighten two binding screws.

The bearings for the headstock spindle are unusually large, being of the integral type, and provide extreme rigidity, which reduces the possibility of chatter. The spindle is made of a special grade of alloy steel, with all bearing surfaces including the tapered hole, carburized, hardened and precision ground.

"For Spee
G
DAVIS BORING TOOLS!

A typical oil well pumping unit, manufactured by the well-known Lufkin Foundry & Machine Co., Lufkin, Texas.

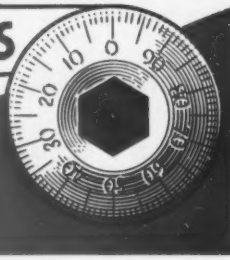
LUFKIN
OIL WELL PUMPING UNITS



Lufkin have found Davis Block Ty
Tools unusually efficient for boring th
for their oil pumping units. Photo sh
boring set-up.

If YOU have a difficult or unusual boring job, it will pay you to send us blueprints of your work for a specific, helpful recommendation. No obligation. Write us today.

DAVIS
BORING TOOLS



The Lufkin Co. are particularly enthusiastic about the famous Davis Cutters, tipped with hard metal, used in these expanding block type tools. (Cutter and Tool shown above.) Davis Cutters cost no more—they are correctly ground—and they fit perfectly. Davis Cutters in Davis Tools are your guarantee of absolute satisfaction.

DAVIS BORING TOOL DIVISION—Larkin Packer Company, Inc., St.

with POLISHED SMOOTHNESS!

That's how this NEW DELTA MACHINE Cuts Copper, Brass, Aluminum

This new Delta Cut-off machine is designed especially for cutting copper, brass, aluminum and other non-ferrous metals with polished smoothness. It is equipped with a special high-speed steel blade and oiling device which feeds cutting oil to the blade. It leaves the cut perfectly smooth, thus eliminating additional finishing and polishing operations. Here is a powerful, accurate machine made available at a fraction of the prices customarily charged for machines of this type. It can be used anywhere, in large shops or small, where non-ferrous metals have to be cut to accurate length on a production basis. At these remarkably low price levels you can actually get two cut-off machines for the price of one—machines that can be used for scores of jobs, and quickly pay for themselves in time and money saved!

Cuts These Materials With Polished Smoothness

Solid Sections: Soft Brass up to 1½" diameter; Half-Hard Brass, up to 1¼" diameter; Aluminum, up to 1½" diameter; Aluminum Extruded Sections, up to equivalent of 2 sq. in.; Copper, up to 1½" diameter, or equivalent of 2 sq. in.; Magnesium (Dow Metal), up to 1¼" diameter; Micarta and Similar Rods, up to 1½" diameter.

Tubular Sections: Soft Brass, Hard Brass, Aluminum, Copper, Dow Metal, Micarta and Similar, Tubing, all up to 2" diameter.

Has Many Special Features

This improved Cut-Off Machine is ruggedly constructed with heavy castings throughout—wide spaced Timken roller pivot bearings and double arbor sealed-for-life bearings requiring no lubrication—powerful Texrope V-Belt drive—adjustable fence—accurately machined table. It is perfectly balanced, making for easy operation—cuts material at any angle and embodies unusual safety features such as husky chip guard, belt and wheel guards.

No. 1631 Non-ferrous Cut-Off Machine, consisting of No. 1600 cut-off machine No. 1626 Blade and No. 1632 oiling device and No. 1399 legs. With blade guard, belt guard and chip guard.

Send for Special Cut-Off Machine Bulletin giving full details and prices on this Delta Cut-Off Machine and all accessories.

DELTA MFG. CO. (INDUSTRIAL DIVISION)

662 East Vienna Avenue, MILWAUKEE, WIS.

Delta Manufacturing Company
662 E. Vienna Avenue, Milwaukee, Wis.
Please send me special bulletin on the new Delta Cut-Off Machine for non-ferrous metals. Also send latest Delta Catalog of Industrial Power Tools.

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Production Perspectives

News of Mass Manufacturing Everywhere

SPURRED by the war in Europe and national defense preparations the current economic upswing has carried industrial production above the 1937 level and close to the post-depression peak last December. The Federal Reserve Board estimated September output at 124 per cent of the 1935-39 average. This was two points under the December mark but two points above August and 13 above the 1940 low last April. Judging by orders now being placed, the board said, expansion of plants and equipment in some industries would be necessary if domestic civilian and export demands, as well as defense needs, were to be met. Larger income payments in the third quarter of this year, the board's monthly review stated, were reflected in increased retail purchases and contributed to somewhat higher retail prices and rents. Prices for basic industrial materials began rising in mid-August and returned to the spring level, which was substantially higher than in August a year ago.

August pay rolls of wage earners in 25 key industries topped July by 3.5 per cent and August, 1939, by 19 per cent, the National Industrial Conference Board reports. Best gains were in the automotive and foundry industries.

WILLIAM S. KNUDSEN, production chief of the National Defense Commission, coupled a call for 100 per cent business participation in the defense program with a warning that "there is a school of thought in Washington which feels that the government should go into business on a large scale. The government is in business on a large scale right now, on a scale as big as it can handle, on a larger scale than any other country except, perhaps, Russia, and we don't want any part of the Russian system over here," the former General Motors president told the annual meeting of the Army Ordnance Association. The audience of more than 1,000 munitions manufacturers, inventors and arsenal officials also heard Knudsen discuss Attorney General Jackson's recent opinion that decisions of the National Labor Relations Board were binding upon other government agencies. "It was implied," he said, "or at least to many people it appeared to imply, that if you were in violation of the National Labor Relations Act before the courts said you were, you were out of luck as far as working for the government was concerned, and I think that's going too far. All of this is based on a statement adopted by the commission that work carried on as part of the defense program should comply with federal statutory provisions affecting labor wherever such provisions are applicable. This means to me that, when the courts have held that labor practices followed by a manufacturer violate the laws of the land, then, as a matter of policy only, defense contracts should not be given to that manufacturer until he changes his policies, and that's all it means to me. Certainly, the defense commission has no authority and does not want to undertake the job of enforcing the labor laws." Giving his "personal interpretation" of the labor policy, Knudsen added: "The idea that an emergency eliminates the right of labor to negotiate belongs in Germany and not over here. The idea of pressure groups on the side of labor or capital belongs nowhere and certainly not over here. The slow-down is criminal and to strike is stupid, unless good and valid reasons are there for it." The production chief reported the commission had cleared $8,253,000,000 of contracts through Sept. 28 and had approximately $4,000,000,000 to go. He expressed belief that plane production in October would total around 900 or 950, falling short of the commission's schedule of 1,133. The reason for this, he added, was that manufacturers were having to expand their plants greatly at the same time they were carrying on production. "We hope to reach 1,250 planes by Jan. 1 and 1,500 by July 1," he said. "After that we should do better up to the spring of 1942, when we hope to reach 3,000." Maj. Gen. C. M. Wesson, the army's chief of ordnance, told the association that the armament program was at least six months ahead of this government's record in the World War. Maj. Gen. James H. Burns, executive aid of the assistant secretary of war, told the association that "American business faces a munitions program in excess of $15,000,000,000"—an amount exceeding "the total army cost of the World War—and the end is not yet." Gen. Burns said his figures were on the basis of the combined "needs of the army, navy and Great Britain." Stressing the necessity for increasing manufacturing capacity of plants for some types of munitions, he noted that "America must not expect these procurement programs to be delivered within a few months. Corresponding programs . . . cost both England and Germany some four years of time, and, if America can cut this factor in two, she will have done a remarkable job." Robert P. Patterson, assistant war secretary, asserted that "in the War Department, we are resolved that red tape should not delay us."

THE Van Norman Machine Tool Company, Springfield, has acquired control of the National Equipment Company through a stock transfer and will use National Equip-

(Continued on following page)

Only America has this unbeatable combination!

HERE – 50,000 PLANTS

Escape the *"Doubtful Few"*

COSTS NO MORE *to get this Parker-Kalon Quality-Control Guarantee with every box of ....*

Hardened Self-tapping Screws
Types, sizes, head-styles for every assembly of metal or plastics

Cold-forged Socket Screws
Cap Screws, Set Screws, Stripper Bolts made to a new high standard of quality

Wing Nuts-Cap Nuts-Thumb Screws
Cold-forged .. Neater, Stronger

Parker-Kalon's Quality-Control Laboratory protects assemblers against "doubtful" screws

To walk into the Parker-Kalon "Lab" is an amazing experience for any man. Nobody expects to find such complete and modern quality-control facilities in the screw industry. Often visitors who witness the routine which starts with analysis of raw material and ends with scientific tests of finished fastening devices, ask – *"Does all this have any practical value to the user?"*

Well over 50,000 plants know it does! They know that Parker-Kalon Hardened Self-tapping Screws, Cold-forged Socket Screws and other fastening devices ALWAYS WORK RIGHT AND HOLD TIGHT! They know that they escape the *"doubtful few"* – the imperfect screws that gum up assembly efficiency, waste time, boost costs, breed complaints.

Figure the increased costs that can result from a few troublesome screws and you'll join the 50,000 users getting the protection of Parker-Kalon Quality-Control. Write for folder and samples. Parker-Kalon Corp., 204 Varick Street, New York.

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

Quality-Controlled **PARKER-KALON Fastening Devices**

PRODUCTION PERSPECTIVES

(Continued from preceding page)

ment's 200,000 square feet of production space to produce machine tools, according to James Y. Scott, president of Van Norman. Scott also revealed that although National Equipment only has about 150 employees at present, Van Norman officers hope that approximately 1,000 men will be employed there by the early part of next year. The present personnel at the plant will be retained, he said. Van Norman's present plan, he explained, is to use National Equipment's plant and facilities for the manufacture of milling machines and oscillating grinders. Van Norman experiencing the best business in its history, has on its books $2,500,000 worth of business. The plant is now operating with 1,600 employees, and despite a new adidtion recently opened, has had to farm out a large share of its work. Further plant expansion is anticipated, officials say.

Twenty-five metal working concerns in Western Massachusetts employed 21,013 persons during September, according to A. R. Tulloch secretary of the Metal Trades Association of Western Massachusetts. The figure shows that there was a gain of almost 4,000 over the total for the same month a year ago. The total number of man-hours worked was 819,770 for September of this year, compared with 619,147.

Employment at the Springfield armory is now over the 4,000 mark, Col. Gilbert H. Stewart, commanding officer reports. The last official figure is 4,009 employees. Output of the Garand semiautomatic rifle is 400 daily. Completion of the new factory building is now expected in December instead of the first of the year, Col. Stewart said. Until the new factory building is completed and equipment is installed, there can be no further material increase in production.

SEVERAL companies in Rhode Island have announced construction of new facilities to relieve overcrowded conditions in existing plants. The Brown & Sharpe Manufacturing Company now has under construction and nearing completion, a new single story building which will be used as an assembly and erecting floor for milling machines. The Abrasive Machine Tool Company of East Providence recently increased its floor space by ten per cent by roofing over and walling in the space between two buildings and is said to be contemplating further expansion. In addition, this company has created more working space through the leasing of separate floor space to house its apprentice training school.

Stacy Machine Works, Springfield, Mass., has increased wages five cents and is offering employees with one year's service a week's vacation. There has been NO labor trouble at the plant.

Approximately 8,500 hourly and piece-work employees of the Waterbury, Ansonia and Torrington, Conn., branches of the American Brass Company have been granted a four-cents an hour increase effective November 1.

The National Defense Commission needs a chairman to remove the obstacles of "red tape bottlenecks and bureaucracy," said Henning W. Prentis, Jr., president of the National Association of Manufacturers, in addressing the Nation's wholesale druggists at White Sulphur Springs, W. Va. The Lancaster, Pa., manufacturer asserted that taxes under the defense program "will be staggering and the first step in offsetting the terrible cost of defense is a strict economy not only in Washington but in every state and every community governing body." Prentis told the druggists he foresaw that current preparedness appropriations will be "small in comparison to what will come" and added it would cost one hundred billion dollars to arm in proportion to other nations. He predicted industry's complete cooperation for defense without need of industrial conscription because "industry already has volunteered."

PUT IN 9 OR 9000
WITHOUT A GAMBLE!
Guarantee
OF HIGHEST QUALITY IN ALL ESSENTIAL CHARACTERISTICS
PARKER-KALON CORPORATION
NEW YORK, N. Y., U. S. A.

YOU'RE SURE ABOUT SOCKET SCREWS GUARANTEED BY PARKER-KALON QUALITY-CONTROL

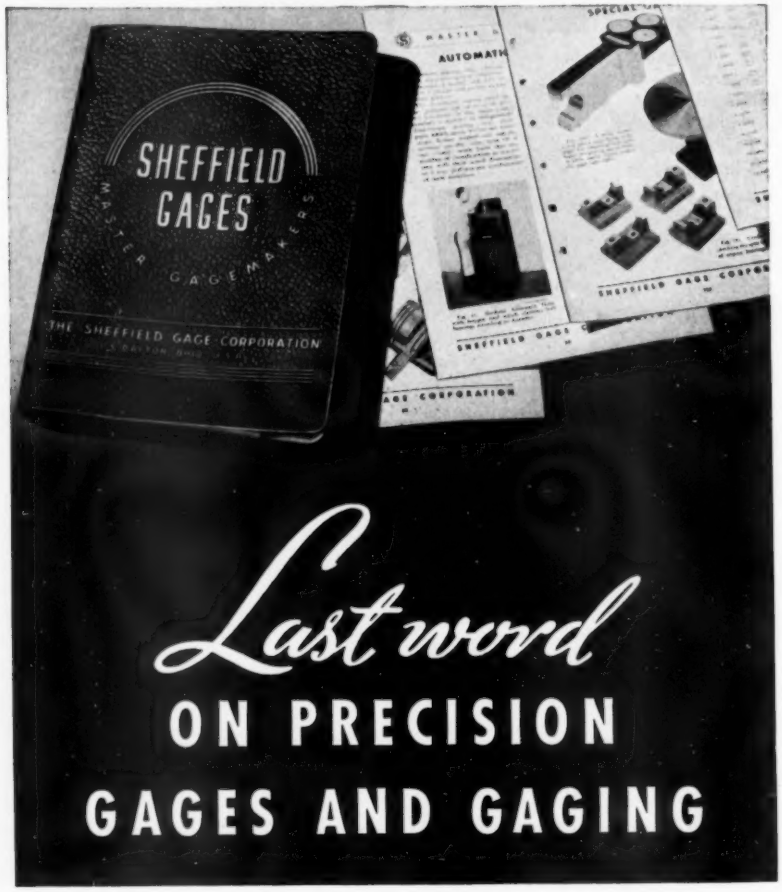
You're free of doubt about *every* socket screw that goes into your equipment or product when you use PARKER-KALON. An unequalled quality-control routine, in which Parker-Kalon Socket Screws must satisfy sixteen exacting tests and inspections, eliminates all gamble. Eliminates it by maintaining a new high standard of quality which bars "doubtful" screws that might delay assembly work or fail in service.

WRITE FOR FOLDER AND SAMPLES . . read about the famous Quality-Control Laboratory which guarantees Parker-Kalon Socket Screws. Learn why so many buyers are standardizing on these Screws that have set a new standard of quality. Free samples and local distributor's name will also be supplied. Parker-Kalon Corporation, 190-198 Varick Street, New York.

Quality-Controlled

16-point test and inspection routine covers: Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Head diameter, height and concentricity; Socket shape, size, depth and centricality; Class 3 Fit Threads; Clean-starting Threads.

PARKER-KALON
COLD-FORGED
Socket Screws



"SHEFFIELD GAGES" just off the press is a comprehensive presentation of precision gages — design, construction and application together with standards and constants useful in practical inspection work.

Manufacturers engaged in the manufacture of engines, machine tools, automotive or military equipment, or any enterprise where inter-changeability of parts is essential, will find this book very useful.

Write for your copy on your own letterhead—no obligation.

THE SHEFFIELD GAGE CORPORATION
1529 EAST THIRD STREET
DAYTON, OHIO, U. S. A.

TOOL ENGINEERS HOLD MEETING

Five Hundred Gather in Cincinnati

Cincinnati—More than five hundred Tool Engineers from all parts of the United States and Canada gathered at the Hotel Gibson here for the Fall Meeting of the American Society of Tool Engineers on October 17, 18, and 19, 1940. As guests gathered in the ballroom lobby on Thursday morning to begin the registration for the three day meeting, the hotel reported an advance reservation by members totaling more than 350.

The first day was taken up with plant tours and there were many things to be seen in this center of the Machine Tool Industry. During the evening the delegates convened for the first technical session of the meeting. They heard a panel of experts speak on the all important matter of engineering education *(see p. 40)* and then carried on a lively discussion of the issues.

The second day was again filled with plant tours as well as with the meetings of various committees in the society. At a banquet held on the Roof Garden Friday evening, W. J. Frederick, Chairman of the Cincinnati Chapter, introduced Judge William D. Handly who welcomed the convention to the city and said they must return again soon. President A. H. d'Arcambal delivered his report on the progress of the society *(see p. 38)* and the reports of the officers were then given. High spot of the evening was a talk by Whiting Williams, Industrial Consultant. on "What Industry Can Learn From Europe" *(see p. 22)* in which he warned that America has learned the wrong things from Europe and advised her to exercise care to keep this a land of opportunity.

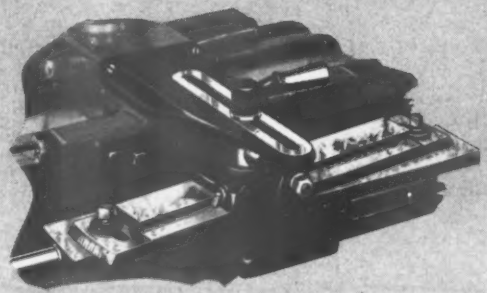
The meeting came to a successful conclusion the following morning with a symposium on "Gear Finishing" in which production of gears by shaving and lapping methods and by grinding process were contrasted. Evidence of the interest in the meeting was the lively discussion which followed the prepared papers.

In a lengthy meeting the Board of Directors made arrangements to divide the Society into districts of two chapters each and have one director from each district. Plans were made for the Biennial Machine and Tool Progress Show to be held in Detroit in March and for the next Semi-Annual Meeting to be held at Toronto, Ontario in the second week of October, 1941.

New!

South Bend Series "S" Tool Room Precision Lathe

16" x 6' South Bend Series "S" Underneath Belt Motor Driven Tool Room Precision Lathe.



TELESCOPIC TAPER ATTACHMENT

Turns and bores tapers up to 3½ inches per foot smoothly, easily, and accurately. Telescopic feature eliminates necessity of disconnecting cross feed screw when taper attachment is in use.

THE NEW South Bend Series "S" Tool Room Precision Lathe has been designed and built for efficient service in the modern tool room. Standard equipment includes draw-in collet chuck attachment, micrometer carriage stop, thread dial, chip pan, collet rack, and telescopic taper attachment.

Spindle speeds range from 21 to 725 R.P.M. Quick change gear box makes all threads and feeds instantly available. Large diameter hand wheels, clear-cut easy reading graduations, and conveniently arranged controls reduce operator fatigue, and assure maximum production.

Smooth vibration-free operation at high speed is assured by the direct belt drive to the spindle. A wrenchless bull gear lock permits engaging the back-gears quickly when slow speeds are required for machining large diameters.

SOUTH BEND LATHE WORKS

926 E. Madison St., South Bend, Indiana, U.S.A.

A TOOL ENGINEER SYMPOSIUM

Should Industry Assume the Burden of Special Education

I. THE IMPORTANCE OF ENGINEERING PREPAREDNESS

by FREDERICK E. SEARLE
Superintendent of Ford Industrial Schools

IN this country we have become accustomed to getting our skilled workmen ready made and the emergency in which we now find ourselves leaves us dazed and uncomprehending.

For years the influx of mechanics from Europe was nearly sufficient to meet our needs. How they acquired their skill was no concern of ours—here they came eager to do what needed to be done. This source of supply finally dwindled to zero before we realized what was happening and before we had made any adequate preparation to remedy it.

To be sure, there were schools for training young men in mechanical skills conducted continuously by some of our famous tool shops over a long period of years. This method provided ample new skilled workmen for those institutions but there was little surplus.

In some cases even those who conducted apprentice training programs gave the new apprentice little opportunity to learn. He was frequently resented by the older men who felt his presence an intrusion and who reluctantly gave him information and real assistance. His progress was measured by what he could wrest from associates who saw in him an aspirant for their jobs or a gawky tyro who was beneath their interest.

His progress was therefore slowly earned and he developed an attitude of resentment to the youngster following him who seemed to him an object for practical jokes rather than a comrade to be assisted in his struggle for knowledge and skill.

Our educational system made little preparation for producing skilled workmen. Those who had developed this country had come the hard way. Their tasks lasted from daylight to dark and even into the inadequate lighting of the night.

Desire to Construct

Public schools replaced private institutions and we boasted that every child should be educated at public expense. It was the conviction that education could free the world from the bondage of work. The children of succeeding generations should grow up without the handicaps of their parents. We proceeded to take the children of the people who had by the sweat of their labor made this a great nation and dedicated them to a training which led them into the professions, into college, into tasks which did not require strong soap to make them presentable at lunch time.

Deep in the heart of most boys at some stage in their development is a desire to use tools—to hammer and saw—to construct; and for this there was little provision in our educational program. We went one step further and moved from the country to a city apartment. In the country there were chores to be done, repairs to be made, there was an outlet for the boy who wanted to do, to express himself in hand work. But in the city there was little required by necessity and the hand training of our youth was relegated to our schools in which we had made little provision for much besides book learning.

Superintendent Searle
"Fear kills . . ."

Over a short period of years we had changed from a people accustomed to hand work in order to assure even an existence with the bare necessities, to an overindulgent nation seeking to avoid labor and teaching our children that what formerly were luxuries had now become necessities.

Youth who are deprived of the privilege of hand work when they naturally crave it and are urged to focus their ambitions on a white shirt and a shiny desk and gold letters on a glass door become poor prospects for doing the work of the world. Yet that is the condition in which we find ourselves today.

We must reappraise our educational theories and this National Emergency Training Program in which we are involved offers us the needed incentive.

Every boy dreams of the big job he may some day do and we frequently fail to teach him that no one ever did, nor ever can do a big job without breaking it down to very simple and understandable units.

Information about the world in which we live comes to us through our senses. The very first information that comes to us is through the sense of touch. We touch our own nose or great toe and learn to distinguish them. The senses of hearing and seeing follow closely and into our consciousness come floods of impressions from the outside world but the most reliable of all is the sense of touch. When we wish to be sure we grasp the object. We feel its surface—it is rough, smooth; its form is solid, hollow, irregular;—it is hard or soft, pliable, elastic, brittle, tough, heavy or light. In the final analysis our touch sense gives us the most information and the most accurate. Sight frequently merely confirms what in our experience had previously been established by the sense of touch.

Now these senses work in very small units and the information we receive from them comes in extremely small doses. The eye roves over a printed page and quickly gives us an impression of its contents, but when we focus on some particular point everything is blurred except the very short word at which we are looking and only one small letter of that word can be in clear vision at any given instant. It is only by these rapidly impinging images that we secure the appearance of contin-

(Continued on following page)

Announced Sept. 3rd—Thousands already in Use!

Industry rapidly adopts—

NEW...CARBOLOY STANDARD TOOLS FOR "UNIVERSAL" SHOP USE ON 80% OF ALL TURNING, BORING, FACING JOBS!

Detroit, Sept. 3.—Mass production on a standardized line of Carboloy tools, designed to cover 80 per cent of all applications for cemented carbide tools, was announced by Carboloy Company, Inc., today.

The introduction of this simplified line of tools—comprising but five styles in three different grades—together with the economies resulting from mass production, has made it possible to price these complete tools well below comparable tools in the past, a typical new 'standard' tool, Style 4, now priced at only $1.85, comparing with tools previously costing $5.84 in lots of one. In quantities of 50 or more this typical tool now costs only $.90.

The program that has made this unprecedented step possible has been under development for the past three years. In the period from 1929 to 1937 prices of Carboloy cemented carbide

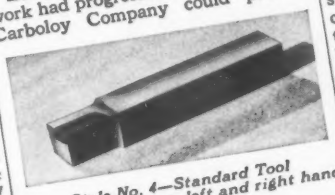
Style No. 1—Standard Tool
Available in 9 sizes

were progressively reduced four times as the result of economies resulting from increased consumption. About that time it became apparent that to widen the scope of useability of Carboloy tools required a complete revision of the principles under which such tools had been produced and sold up to then. What was needed was mass production of complete carbide tools on a scale never before attempted in this country.

Since 1937 extensive research work in the laboratory and in the field has been devoted to determining the fewest number of 'grades' of Carboloy and the simplest line of tools that would meet the vast majority of all carbide tool applications.

New $1,000,000 Plant Part of Program

Early in 1938 this development work had progressed to a point where Carboloy Company could proceed



Style No. 4—Standard Tool
Available in 9 sizes, left and right hand

with its next step—the expenditure of a million dollars on a new plant and equipment to expand and concentrate manufacturing activities. This plant, completed in the spring of 1939, was designed with a production capacity of ten times the amount of cemented carbide then consumed by industry, with provisions for expanding metal production to many times that amount.

Since that time, research and field experimental work has resulted in reducing the number of grades of Carboloy required for the vast majority of applications to only three —one new grade for steel cutting, and two for cast iron. Further, it was found that five styles of tools in each of these grades would cover 80 to 90 per cent of all turning, boring and facing applications.

The basic design of these tools is

Style No. 13—Standard Tool
Available in 5 sizes, left and right hand

such that several hundred variations can be rapidly ground in the tools by the user to meet special requirements. With the fast, simple grinding procedure developed during the past five years and now widely used by industry, such tool changes can be rapidly and economically accomplished. This rapid grinding procedure, plus the fact that the price of these new standard tools is comparable to that of many ordinary tools, brings to the field of Carboloy tool use a flexibility that permits broad 'universal' use of these tools within the average shop on short job-lot work as well as production runs.

The new standardized tools are carried in stock, ready for shipment, completely ground and ready for use. An extremely valuable feature is the incorporation of a ground-in chip breaker on all standard tools designed for the machining of steel, at no additional charge.

The new program, according to the announcement, is anticipated to produce a wider scale use of carbide tools, thereby reducing the cost of production of basic cemented carbides to [illegible] that in spite of higher [illegible]ost.

Carboloy Announces 6th Price R[illegible]

Since the year when Carboloy tools were first introduced it has been [illegible] Carboloy Co[illegible]

For a number [illegible] have realized tha[illegible] reducing the P[illegible]let[illegible]

- ✓ LOW PRICED! *(Check against any other cutting tools)*
- ✓ SIMPLIFIED ORDERING!
- ✓ SIMPLIFIED TOOL STOCKS!
- ✓ IMMEDIATE SHIPMENT!
- ✓ YOU GET THEM ALL GROUND READY FOR USE!

(Steel cutting tools furnished with ground-in chip breaker)

Example of chip breaker ground in steel cutting tools.

Have You the Facts?

WRITE FOR CATALOG GT-125

CARBOLOY COMPANY, INC.
11145 E. 8 MILE ST., DETROIT, MICH.

Chicago • Cleveland • Newark • Pittsburgh • Philadelphia • Worcester, Mass. • Los Angeles
Canadian Distributor: Canadian General Electric Company, Ltd., Toronto

CARBOLOY
REG. U. S. PAT. OFFICE

TANTALUM CARBIDES
TITANIUM CARBIDES
TUNGSTEN CARBIDES

ENGINEERING PREPAREDNESS

(Continued from preceding page)

uity and sequence even in a landscape.

The same law applies to the sense of taste. If we concentrate on the sourness of the pickle the fact that it is also bitter, salty, and sweet will not register. These facts must come in succession but their impressions may overlap.

The conductor quickly detects a misnote of one of the minor instruments or he may close his consciousness to all sounds save from one selected piece although the ear receives the impulses from the whole orchestra.

Our senses bring us these messages in rapid succession to be effective, if we slow them down they become inaccurate and blurred. In the case of sight when movement of the eye ceases and there is no temporary relief through winking, the only impression carried to the conscious brain is that of color — and even that grows gradually dim.

In a similar manner the things that we do at any given time must be very simple.

Problem Composed of Simple Parts

Any task within the power of man to do first must be broken into very small units. These units must be performed in their proper sequence and then assembled into the completed whole.

Every job which is properly done involves disassembly and, finally, reassembly. It is as though we had analyzed it by passing it through a dispersing lens and then had gathered the parts together by sending them on through a converging lens. This is one of the greatest educational lessons in all teaching and nowhere outside of shop work is it more easily illustrated and carried out.

If the student is not to be confused shop work like a mathematics solution must present a logical sequence of very simple operations. Step by step the job grows to completion in a natural order. To him there is no big job for the genius of man has split it into understandable units.

The student finds that he must follow through certain operations in a prescribed order to successfully make a reamer; carrying the job to the lathe, mill, heat treat, and grinder.

That as a student he should follow the job through the shop making one reamer himself or even a hundred reamers would be questionable procedure. He can probably learn more in a given time about shop work by spending several consecutive months on each machine. But always in his mind there must be this picture of the division of work into very simple and understandable units.

The brain needs practice in understanding simple operations and sequence of operations but the hand must have much more. Until the hand of the worker acquires this skill (and it can be gained only by much repetition) he has no claim to the title of master workman.

That this need for skilled workmen is a real one and not merely an imaginary bogey built up by changing demands is certain. Into your offices and mine come government representatives from the army, from the navy; employment managers of big business and little business all seeking answers to the same question. Where can we find workmen with sufficient skill to meet our immediate needs and those of tomorrow. One government department reports a need for more than 7,000 such men due to its immediate expansion program.

As a nation our eyes today are on the educational horizon searching the ranks of youth for those who are fitted to do the work that needs to be done. And youth will respond. Not only are they willing to undertake this work but many of them are already filled with a desire to accomplish it. With proper help from us this will grow into an ardent purpose which will overcome all obstacles, do the job that is ahead of us, and build a new recognition of the dignity of labor in the hearts of a free people.

What needs to be done is fairly well recognized. Where and How are still under consideration.

The task should be undertaken by us with the understanding that the situation is no mere temporary problem. Its solution must have a permanency and we must meet it not only with the Will to do a necessary job but with a consuming desire on our part to so direct a large body of our youth that they may skillfully do the exacting work ahead of us.

In the doing our young men will derive much pleasure and the whole nation may receive an invigorating impulse.

There are three principal agencies which can be used for this training program. Public Schools, Schools in large industries and schools in small industries. The two latter have been separated, not because there is any natural or logical difference between them but because many managers feel that the small size of their plants makes a training program ineffective or impossible.

Such an attitude will do a great deal to hinder real progress and the small shops will suffer first and also most.

Wherever the training is given, certain sequences should be followed and proper attitudes toward work developed.

The first emphasis should be placed on Safety. By the use of printed matter and by talks in groups or alone each new student should become Safety conscious. Every time his work changes to a new machine or a new environment the first thought should be to move and act safely in the new surroundings. Most accidents like manufacturing mistakes are human mistakes. The personal equation is the determining factor in most cases and that individual is fortunate who early acquires safety habits in all his work. Orderliness is the second great lesson a student must learn. Confusion and litter have no place in modern industry.

The third ideal to be stressed is Accuracy. But this alone is not enough. Greater accuracy is ever being demanded and the time element must also be watched. To train a boy to do accurate work without considering the time element would leave him with no hope of employment under the rigid demands and keen competition of today. This also has a deeper significance for the worker himself, for life and time are closely linked and there is a definite satisfaction in finishing a job in an allotted time.

In whatever school the student or learner receives his training these ideals should be kept constantly before him.

Schools are Handicapped

Public trade and vocational schools can give beginners a splendid start in the right direction. However they are greatly handicapped in reproducing the shop conditions of industry. Cost of equipment with short hours of operation and the difficulties of securing suitable work in sufficient quantity are two factors which prevent such schools from giving complete training in mechanical courses.

Schools within industry can command both equipment and plenty of work. It is they who must carry the greater part of the training leaving to the public schools as much of the initial work as they can handle.

All industry is in its essential make up an educational institution. Every leader, foreman, superintendent, and manager who is doing an exceptional job is basically a teacher. It is their job to instruct those under their supervision in all problems of manufacture and management.

A training program therefore has its logical place in industry and the larger firms have been quick to recognize its feasibility even when they did not admit its necessity.

Today each shop is confronted with the problem of securing enough men with sufficient training for its present needs and to make provision to fill vacancies and provide for any expansion in the future knowing almost to a certainty that the shortage of mechanics will be more acute by next spring.

The facts seem to point to one conclusion. Shops must establish training programs either collectively or individually.

Neither the technique nor the expense should prevent even small shops from some educational work. A large number of little businesses engaged in such a movement would have a far reaching effect in the tool making industry.

High School graduates are available in large numbers and no tool shop is too small to take some for training. If you are fortunate enough to secure those who

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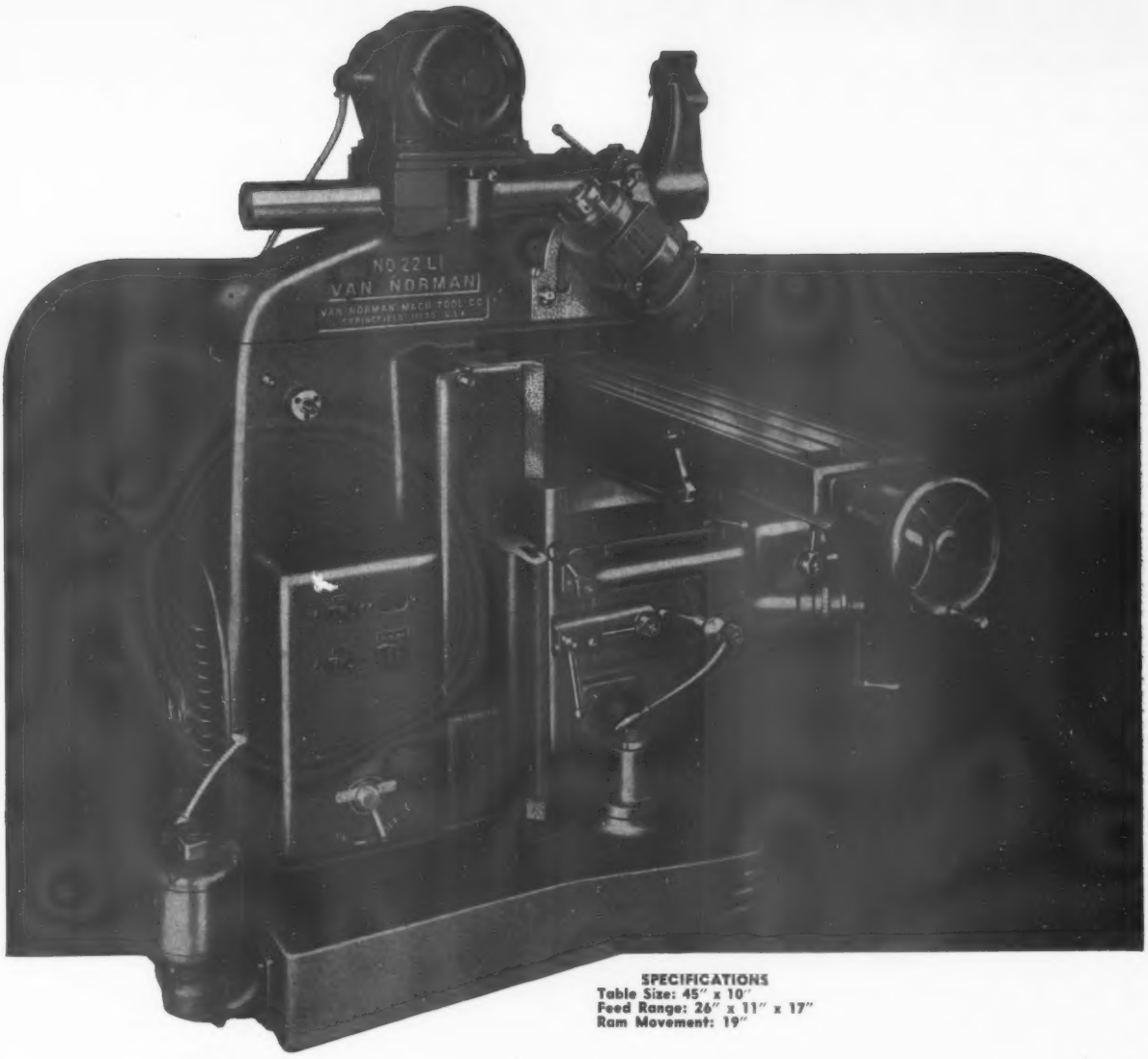

SPECIFICATIONS
Table Size: 45" x 10"
Feed Range: 26" x 11" x 17"
Ram Movement: 19"

TO DO A LARGER AMOUNT OF MORE ACCURATE WORK, with greater ease of operation and control . . . that is the purpose behind the design of these new Van Norman Ram Type Universal Millers. Operator has ready to his hand the convenience of directional front and rear power controls . . . 6-way rapid traverse, front and rear . . . large dials . . . and the time-saving, error-reducing combination of swiveling cutterhead and sliding ram that permits changes from vertical to horizontal to angular milling ***with minimum change of setup.*** These valuable Van Norman features . . . plus rigid, high-precision construction and exceptional range of work . . . sum up to modern milling performance that assures highest output, quality, and return on investment. Write today for detailed bulletins on the complete line of Van Norman Ram Type Universal Millers. No obligation is involved.

VAN NORMAN MACHINE TOOL CO., SPRINGFIELD, MASS.

VAN NORMAN MILLING MACHINES

ENGINEERING PREPAREDNESS

(Continued from preceding page)

have had shop experience in school time will be saved. In any case by careful selection a large percentage of such trainees will develop into valuable shop men.

If the shop is small one man can teach all necessary class work and also supervise the shop work. In some localities arrangements may be made with the public schools to conduct classes in mathematics and mechanical drawing. However, it is usually more satisfactory to have the class work done at the shop when provision can be made for it. Such instruction can be kept more closely associated with the shop work. It is therefore usually more satisfactory to the shop management and also to the student.

On what shop work the student should start must be determined by the type of work being done in the plant. In any case there is always something which needs to be done within his power to do. A student should never be humiliated by being asked to do practice work merely to acquire skill.

Importance of Preventing Fear

To do this introduces into the mind of the learner the fear that he is incapable of doing useful work. Fear kills initiative, ambition, desire. Under its influence neither the brain nor the hand can function freely and accurately. If rapid progress is to be secured, or even a normal advance, the apprentice must feel that he is a part of the organization and useful in all his tasks.

With this system of training—in the present emergency—it may be necessary to hold many of the students on jobs where they have acquired sufficient skill to meet the shop demand. Their class work can continue and later it may be convenient to move them to another machine for further shop training.

Conditions compel us to train as rapidly as we can a sufficient number of young men to handle the immediate business as satisfactorily as possible. Because of our effort to speed this training program special emphasis should be placed on the observance of safety precautions and one of the best safety rules is to put into the hand of the student printed regulations that apply in your shop.

One man of earnest purpose even on part time can do much to stimulate a whole group. Drawing and mathematics classes dealing with practical shop problems spread their influence beyond the younger group who are attending and draw in some of the older men who feel the need for review or advance in those fields.

Plastic clay brought into the classroom and formed to meet specifications of a drawing or mathematical problem quickly shows the instructor if the student has the correct understanding of the problem. It is also a great time saver for the student.

The clay can be quickly cut by using a small scroll saw frame fitted with fine piano wire. Sections made to show all views of a drawing or the solid angle involved in a machine set up save time and error.

Practical demonstrations of this sort soon cause the student to feel that he is on the road to progress.

Frequently there is some one in the shop to whom this teaching work would be a delight and who could within a reasonable time show actual dollar savings due to better shop practice, resulting in faster time and less spoilage.

If the students and instructor consider the work a game in which all can win by increasing their efficiency the step up will not be confined to the shop.

The men will go out into a pleasanter world at night, return to a pleasanter home, and come to their work with greater pride the following day.

Groups of such workers proud of their increasing skill to produce better work in less time should have a marked effect on themselves and their associates.

It seems to me that this is the way, not only to meet our present emergency, but to deepen our faith in the democracy which is our heritage.

(Symposium continued on following page)

Sundstrand Rigidmil
Speeds Production, Saves Space

COMPACTNESS, many spindle speeds, automatic hydraulic cycles, and other advantages make the Number 0 Rigidmil shown above an excellent investment. Used on a large number of different work-pieces; it speeds production, cuts costs, maintains high accuracy, improves finish, saves floor space.

When photographed, the No. 0 Rigidmil was straddle-milling hexagon bolt-heads at high speed, a small-lot job between longer runs on other work.

Close-Stop and Dwell

Also shown is a pin with angular slot 1/16" wide by 3/4" deep. Rigidmil increased production, and improved finish on the slot. Close-stop and dwell, at each end of table movement, holds reversal to ±0.001". Smooth, uniform hydraulic feed prolongs cutter life, reduces breakage.

Investigate Rigidmil possibilities for your milling.

Write for Bulletins

Bulletins 382 and 383 illustrate and describe Rigidmils No. 0 and No. 1; show cycles, list specifications. Write for your copies today and see how you can save.

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RIGIDMILS-STUB LATHES
Tool Grinders - Drilling & Centering Machines
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USE "LOGAN" EXPERIENCE ON YOUR SHELL HOLDING EQUIPMENT ★ ★ ★ ★

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FOR over twenty years "LOGAN" has made air and hydraulic operated holding devices for all sizes and types of shells or similar forgings—but to the best of our knowledge this is the first time drawings and data of this type have been assembled and made available for general use. "LOGAN" Collet Chucks and "LOGAN" Expanding Mandrels illustrated in this new bulletin have been tested in actual daily service with excellent results. You can't afford to turn down the advantages of "LOGAN'S" experience on Shell Holding Equipment. Write today for the new "LOGAN" Air and Hydraulic Operated Shell Holding Bulletin.

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LOGANSPORT MACHINE, INCORPORATED

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Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

Should Industry Assume the Burden of Special Education

II. COOPERATIVE EDUCATION

by DR. R. C. DOWDY
Dean, College of Engineering and Commerce
University of Cincinnati

A MACHINE which is idling does not give evidence of its condition. Bearings may be loose, parts worn or weakened, accessories may even be missing, yet the machine appears to be ready to operate. But if the application of full load brings out a chorus of unusual sounds and a journal here and there begins to smoke, one may be sure that a little tinkering and readjustment is necessary and perhaps some replacements may be needed.

During the past ten years, the great machine called "American Industry" has had few opportunities to test its running condition or its ability to handle even a moderate load. The events of the past year, and particularly those of recent months, have already thrown some units of this machine into high-speed performance, and it seems almost certain that for the immediate future, at least, nearly every phase of production must contemplate acceleration and expansion.

While all Americans have pride in American industry, and confidence in its ability to solve the multitude of problems with which it is confronted, those best aware of the situation do not minimize the difficulties of putting this great plant into efficient running order again.

Assuming that all problems of finance, distribution, transportation, social security, and taxes have been happily solved to everyone's satisfaction, industry still needs plant equipment and the personnel to operate it; and since plant equipment must be produced by human ingenuity, technical design, and skilled craftsmanship, it is obvious that the whole scheme of industrial production rests on the ability and training of those who are engaged in it.

It is very difficult to obtain statistics which give a clear picture of our national employment conditions. It is doubtful whether anyone ever knew just how many people were out of work in this country at any given time, and still less do the figures reflect the potentialities of those who were unemployed. With conditions changing rapidly as they are at the present time, figures are obsolete before they can be compiled. Perhaps general impressions resulting from widely spread contacts and inquiries are adequate to indicate general trends and probable needs of industry and to serve as a guide in formulating a program of practical usefulness.

Variety of Industries Included

The College of Engineering and Commerce of the University of Cincinnati through its co-operative system of long standing is perhaps uniquely placed among technical institutions in its ability to obtain a broad cross section of industry and its requirements. The co-operative course was initiated in 1906 by the late Dean Herman Schneider with the co-operation of about a dozen local firms in which twenty-five students were placed working in pairs alternate weeks in the factory and in the College. The enrollment has increased to approximately 1,300 engineers, about 500 students in business administration, and nearly 300 in Applied Arts, all of whom are on the co-operative plan. Nearly 500 firms are on the list of co-operative employers, but by reason of seasonal and economic fluctuations students are placed with only 350 to 400 of these firms at any one time. The geographical distribution of employment has expanded until it now reaches from the Great Lakes to southern Tennessee and from Oklahoma to the Atlantic seaboard. The period of alternation has been increased from time to time until, at present, students change from industry to College every eight weeks.

Cooperator Dowdy
"It is not to be expected..."

The increase in numbers both of students and of cooperating firms, and the geographical spread have made it possible to include a wide variety of industries among the co-operative employers, and have brought the College into contact with industrial conditions not only in its immediate vicinity but throughout a large portion of the industrial area of the United States.

It may be of interest to note in passing that a report and recommendation from the Coordination Department of the College of Engineering and Commerce at the University of Cincinnati following a survey made during June and July of this year arrived at precisely the same conclusions and recommendations as those released on September 3, in the statement of Dean Potter of Purdue University resulting from his investigations as consultant for the Office of Education.

This continuous and varied contact with industry has two important reactions; first, it influences the program presented by the College and the method of presentation; and, second, it has a marked effect on the attitude and development of the student.

Under the co-operative plan, it is obviously unnecessary to provide student shops, either to teach fundamental machine operations or to simulate production conditions. The student shop, at best, is a colorless and weak imitation of actual industrial practice, and it is probably a recognition of this fact which has led to decreasing emphasis on shop practice courses even in the full-time technical schools. This tendency toward reduction of time allotted for shop practice cannot be taken as an indication that practical

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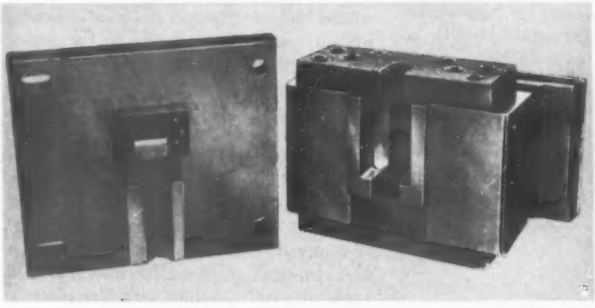
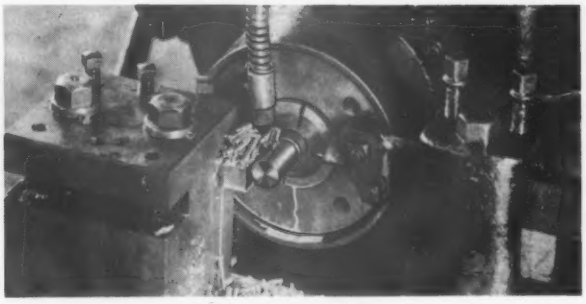
Which is quicker...

NEW PLANT *or* BETTER TOOLS



Saves 4 years machining time. Back in 1935, Carpenter was consulted to improve a heading die for manganese copper pins. Thanks to the perfect performance of the die steel, one machining operation was eliminated. By 1936, 8500 pieces had been produced. Late in 1939, the same die was still operating with no signs of breakdown. Forming temperatures range from 1000° F. to 1200° F.



1924 more pieces per month from turret lathe. Faster cutting did the trick. Tests showed that by substituting the recommended Carpenter Matched Tool Steel, 22 pieces per hour could be produced instead of 12. As an extra bonus, life between grinds was jumped 35%.

OBVIOUSLY it's quicker—and cheaper—to step up the performance of your tools.

But in many plants, tools are taken for granted. Tool costs are often measured *only* by the amount spent for steel plus the labor in making the tool. Tool performance is often measured *only* by the pieces turned out by the tool.

Actually, the true measure of tool performance includes *the output of the machine or press in which the tool is operating, over a period of time.* It is not how many pieces the tool will make that counts—but how quickly it will make them. Each time a machine or press has to be stopped to repair, regrind, restone or replace a tool, ten minutes to several hours are lost from production. Anyone can make a blanking die heavy enough so that with frequent regrindings it will turn out a million pieces—but it is not so easy to make a blanking die that will turn out a million pieces with no regrinds—or only one or two.

It takes competent tool design and expert tool making technique on your part, backed up by just the right tool steel correctly heat treated. And right there is where Carpenter comes in with a plan you can use to make substantial additions the real capacity of your plant — and to cut unit costs. By using this plan, representative companies have increased the output of individual machines and presses by amounts varying from several thousand to nearly half a million extra pieces per month. In percentages, the increases have ranged from 7% to 47%.

Translate these figures into averages and multiply by the number of machines and presses in your plant. How much would that amount of extra output help in meeting today's demands? How far would it go toward reducing unit costs?

Would it be worth enough to gamble 14 minutes on reading the whole story in Carpenter's new booklet on "Spotlighting Hidden Plant Capacity"? If it would—use this coupon to get without obligation, your free copy. You will find it interesting to read—and truly valuable if you are seeking new ways to expand output or reduce the cost of your product.

TELLS WHERE TO LOOK FOR HIDDEN PLANT CAPACITY

Carpenter
MATCHED
TOOL STEELS

THE CARPENTER STEEL COMPANY
Bern Street, Reading, Pa.

YES! I'll invest 14 minutes reading time to discover how to get more output from my machines and presses. Without obligation, please mail your "Hidden Capacity" Booklet.

NAME_____ TITLE_____
(Please Print)

FIRM_____
(Firm Name Must Be Given)

ADDRESS_____

CITY_____ STATE_____

COOPERATIVE EDUCATION

(Continued from preceding page)

experience is less necessary now than formerly, but rather an admission that modern industrial practice cannot be imitated on a small scale. Under the co-operative plan, the machinery and methods of production are studied where they are actually in use, and practical experience is acquired collaterally with technical training so that both are given added significance by reason of their obvious and studied correlation.

A co-operative course can be successful over a long period of years only if it meets the requirements of industry, both in its undergraduate student employees and in its graduate engineers. It is obviously a matter of no little inconvenience for the co-operating firms to arrange sequential and progressive series of jobs for pairs of students who will alternate every two months. The most that industries can hope to get out of it is that, by taking part in such a program, they may be able to obtain young men particularly useful in their own organization. That a very large proportion, varying in different fields from 60 to 85 per cent, of the co-op graduates at Cincinnati remain with the firms with which they have worked as students and that many of the firms have continued co-operative employment for more than 30 years seem to indicate that at least one of the objecvtives of the co-operative plan has been achieved.

Specialization Avoided

It might at first seem that, in order to supply satisfactory students and graduates to a great variety of industries, it would be necessary to provide many highly specialized courses in the college curriculum. The contrary, in fact, is the case. A superstructure of specialization is not difficult to build on a foundation which is sufficiently broad and firm. It is for this reason that very few specialties are to be found in the co-operative course. The first two years are devoted primarily to mathematics, mechanics, chemistry, and physics, and the last three years to departmental technical courses of broad applicability, together with English, history, economics, management, labor relations, and the like, to a lesser extent than should be, but as much as time permits. There are very few elective specialties, much to the disgust of certain students who would like to begin specialization in their freshman year, but to the general satisfaction of most of the alumni who have found that "puppy love" does not always lead to marriage. Variety of experience, some of it obtained directly, some of it vicariously from co-ordination classes and through exchange of ideas between students who are engaged in different kinds of work, generally leads to a broadening of interest and not infrequently to a revision of the student's early ideas about his life work.

But the principal difference between the college work given under the co-operative plan and that given in the usual full-time four-year course is not to be found by a comparison of catalogues. Substantially the same courses will be found in both programs with at least as many clock hours available in the five-year co-operative course as are scheduled in the four academic years which comprise the standard program in spite of the fact that two years of actual working time are included in the co-operative plan. The economy of time which makes this possible is effected by reducing vacations and by intensifying college work during the relatively short term. In spite of some unfounded opinion to the contrary, it is a matter of experience in co-operative schools that students can carry an exceptionally heavy schedule during their periods of college attendance, and that the alternation from school to work, far from being a difficult adjustment, is actually beneficial and refreshing both physically and mentally.

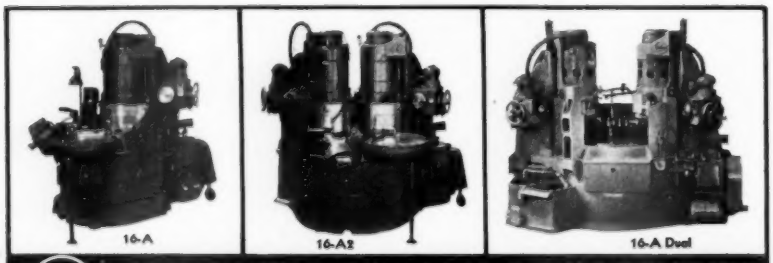
It is not to be expected, nor is it necessary, that the student's experiences in employment synchronize with the subject matter discussed in his college courses; but the whole idea of co-operative training is lost if placement in industry is con-

(Continued on following page)

Continuous
PROFITS

FROM CONTINUOUS OPERATIONS ON BLANCHARD AUTOMATIC SURFACE GRINDING MACHINES

The Blanchard line of Automatic Surface Grinders has established an enviable reputation for earning profits on flat surface work produced in quantity. The No. 16-A is equipped with one wheel, and performs the following operations automatically — chucking, grinding, sizing, measuring, unloading, demagnetizing, and cleaning the chuck face. The No. 16-A2 retains all the automatic features of the 16-A, but is furnished with two wheel heads — one for roughing and one for finishing. This allows the use of a different grade wheel on each head which results in greater accuracy and production, and finer finish. The No. 16-A Dual is actually two 16-A machines in one. Work is loaded and unloaded by two operators, one on each side of the machine. This saves floor space and fixture cost. Send Blanchard full information on your flat surface work — full information on how to cut your costs will be sent gratis.



BLANCHARD
THE BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASSACHUSETTS, U. S. A.

In vertical Milling Machines also, rigidity originates in the column — the backbone of the machine—and determines the productive capacity of the machine more than any one other factor.

Note how carefully the column of a Milwaukee Vertical Milling Machine has been engineered for the proper distribution of metal — an inside horizontal wall divides it into a double box section, the cross mounting of the motor permits a solid rear wall, which, together with the solid front face, assures an unusually rigid structure.

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MILLING MACHINES

MILWAUKEE MILLING MACHINES

COOPERATIVE EDUCATION

(Continued from preceding page)

sidered merely as incidental or perhaps accidental, part-time employment. The work to which the student is assigned should be both varied and progressive, beginning with semi-skilled or unskilled labor and proceeding to jobs of increasing importance and responsibility. The organization of an effective work program is not easily accomplished. It requires an experienced staff of co-ordinators and a high degree of co-operation from industry, and the difficulties are greatly increased during periods of economic depression. But, under normal conditions, programs can generally be arranged which give students an opportunity to obtain a fairly comprehensive and certainly realistic view of some industry embodying the technology in which they are interested.

While there may not be a direct or immediate correlation of practical experience with theoretical study, it is generally the experience of those who teach cooperative students that their practical experience is reflected in the class room. Much purely descriptive matter concerning machines, methods of production, and processes may be omitted entirely or mentioned very briefly, and the realistic background which the student has acquired seems to be a definite help to him in understanding techniques with which he has not had direct contact. Even in rather abstract and theoretical courses there is much illustrative material which the instructor may use, and the students themselves often suggest very interesting questions arising from their own observation. In such subjects as "management" and "labor relations," the realistic information of the class may be almost an embarrassment of riches to the instructor. In the matter of thesis subjects, shop experience often suggests more and bigger problems than can be handled, but it is interesting to note that students are observant of what goes on about them and recognize opportunities for research.

Four Effects on Student

Besides these reactions which the cooperative plan has on the College, there are at least four important effects which co-operative training has on the student. First, it aids in developing a mature point of view; second, it is in many cases a realistic and convincing method of vocational guidance; third, it affords opportunity for specialization in technique without narrowness in academic programs; fourth, it gives the student a practical training which is advantageous to him both professionally and financially in placement after graduation; he has a certain confidence in himself, and, at the same time, a realization of the demands of industry and his own limitations, which generally insure good performance in his first job.

"One half the world does not know how the other half lives," and certainly the college campus and the factory are not in the same half of the world. It is to no purpose to discuss which is better or which is worse, which is right or which is wrong, but it is important to note that the two environments are certainly different. Under our school system the minimum age at which a boy can regularly graduate from a technical college is about twenty-two years; the average age is possibly a year or two more than that. If until that time the student, then a young man, has spent most of his time in educational institutions, even allowing for some sporadic part-time or summer work, he has acquired rather fixed habits, ideas, and scales of value. By reason of his age and possibly, unfortunately in some cases, because of his training, he may feel that he has already made a rather definite accomplishment, and while he may not be conceited, there may be many things which he feels he should not be expected to do. This is not meant to be a carping criticism of the college graduate, but it is a psychological fact that even a subconscious resentment may prevent one who has studied differential equations from learning a valuable lesson in practical arithmetic from the shop foreman. The young co-operative under-graduate enters industry on a par with his fellow workmen. He learns to

(Continued on following page)

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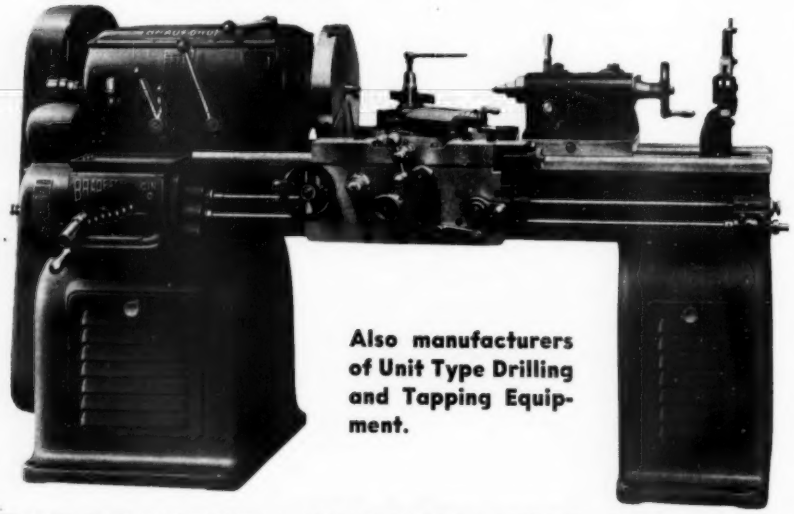
Put a Bradford Lathe to work and step up production on a large variety of jobs. Its sturdy construction, simplicity and convenience of tooling will be a decided asset to your production needs. Check these features... 12 selective speeds... speed range from 16 to 400 RPM.... Timken Bearings or taper bronze bearings, on high carbon steel spindle... hardened alloy steel gears running in oil... quick change gear box for selective speeds and thread cutting... an unlimited range of feeds and speeds through the quick change device... push button start and stop... multi-disc clutch and brake... accurate spindle control. Get more facts and figures on this cost-saving better lathe today. Write, right now, for full details and descriptive literature.



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Dealers wanted in some areas

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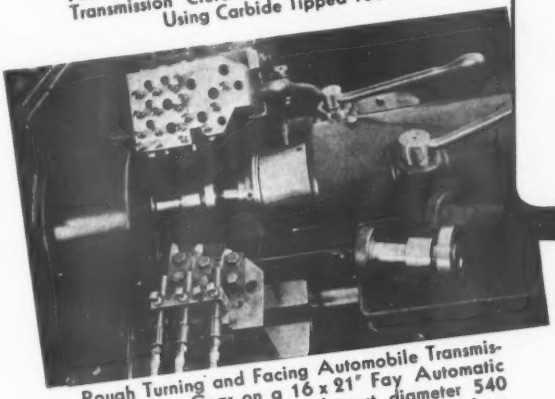
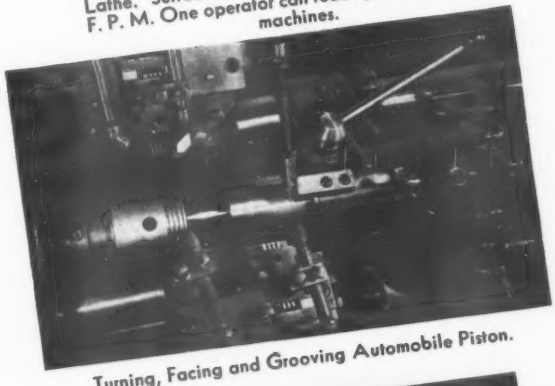
First Operation — Rough Turning an Automobile Transmission Clutch Gear on a 12 x 21" Fay. Using Carbide Tipped Tools.

One operator can readily run the two machines for roughing and finishing this piece.

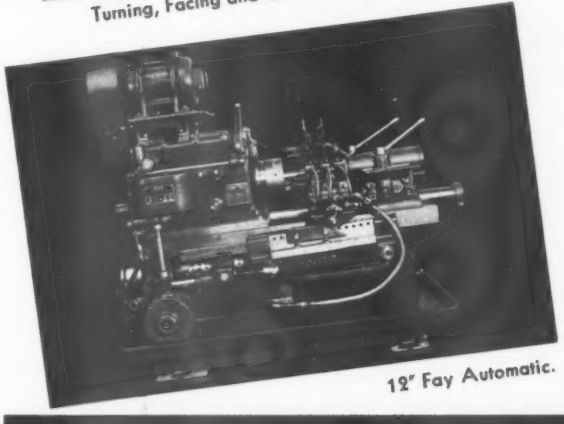
Second Operation—Finish Turning an Automobile Transmission Clutch Gear on an 8" x 21" Fay. Using Carbide Tipped Tools.



Rough Turning and Facing Automobile Transmission Cluster Gear on a 16 x 21" Fay Automatic Lathe. Surface speed on largest diameter 540 F. P. M. One operator can readily run two of these machines.



Turning, Facing and Grooving Automobile Piston.



12" Fay Automatic.

Looking Forward

TODAY, the rapid development of fast-cutting, hard-alloy tools has reached a point where only the most rugged machines can use them to maximum advantage, relegating others to the economic scrap heap for, however good the tools, they can never be efficient except on machines built to use them.

Tomorrow will see still greater improvement in these tools, imposing still heavier loads on the machines that use them. Wise is the manufacturer who gives full weight to this consideration.

Fay Automatic Lathes today are extracting every cent of profit from the superior performance of these tools *and will continue to do so.* For, into them is built a reserve capacity that will enable them to operate at the highest speeds that tools and materials will allow, not only today, but for years to come.

Descriptive literature covering all models is available and we are always ready to demonstrate their value in the Production Line.

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Manufacturers of: Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Double-end Milling & Centering Machines . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chasers.

JONES & LAMSON MACHINE COMPANY

Springfield, Vermont, U. S. A. ***Profit Producing Machine Tools***

COOPERATIVE EDUCATION

(Continued from preceding page)

appreciate their skill and recognize their limitations and perhaps most important of all, if the student is ever to have much to do with the handling of men, he may come to understand something of their point of view and their reactions to managerial policies. It is a fundamental point in the philosophy of the co-operative plan of education that practical experience may be distributed through the years which comprise a formative period in the student's life. If he learns nothing else by this experience, he acquires some idea of the value of a dollar in terms of work and the value of time in terms of a dollar. These are important "conversion factors" which cannot be found in a handbook nor taught in a class room.

Differing Views on Vocational Guidance

What "to be, or not to be—that is the question" which confronts every youngster who has the ambition to exert a determining influence on his life. If he expects to undertake a professional career, some of his decisions unfortunately must be made at a very early age when he is as yet unable to determine his own abilities and inclinations, and is often uninformed, or even misinformed, about the vocation which seems to appeal to him. For many years past there has been continually increasing interest in vocational guidance. This is evident not only in schools and colleges, from the kindergarten through adult education, and in secular and religious organizations, but it is an important problem with which industrial personnel departments have directly or indirectly to deal.

There are widely divergent views on vocational guidance. Some experts feel that a few psychological tests will reveal exactly what an individual can do and what he cannot do. At the other extreme there are those who believe that human nature is so complex and changeable and environment so varied that the only thing to do is to let nature take its course. But whatever may be the value of this diagnostic phase of vocational guidance, there is another and larger part of the program which all agree has been definitely helpful to young people, and this is the collecting and disseminating of vocational information. Freshmen, as they come to college today, are very much better informed about the requirements and the activities of the professions which they seek to enter than they were twenty years ago; and although some are misled by popular trends or romantic appeal, they have for the most part made studied and intelligent selection of their fields based on fairly extensive and accurate information which has been made available to them.

But notwithstanding all of the calipering, sorting, and inspection, there is still an occasional square peg in a round hole. If this is an academic misfit, it will likely be discovered by any plan of education, but if it is the practice rather than the theory of his profession for which the student is not suited, only actual experience will indicate the fault and perhaps correct it or suggest a remedy.

It has been stated previously that to meet the needs of a great variety of industries, the academic part of a co-operative program must develop along broad and fundamental lines. This is quite in accord with the general trend and practice in engineering and education, but it must also be recognized that the individual student may often have a highly specialized interest. One student in mechanical engineering may be particularly attracted to automotive engineering, while another may find that power development or machine tool design seems most desirable to him. These specialties involve largely overlapping fundamental theory but widely varying techniques. While being given uniform college programs, students may at the same time be allowed to satisfy individual interests in the co-operative employment on which they are placed; and on the other hand it not infrequently happens that students,

(Continued on following page)

DoALL SAVED 16½ Hours

Making Double-Mesh Metal Lathe Die

PLANT
Portage Machine Co., Akron, Ohio

MATERIAL
Oil hardened tool steel

OVERALL SIZE
18½" x 10¾" x 1"

30 OPENINGS
Each 1½" long 5/16" at small end, ⅝" at large end

Former milling time.... 20 hours
DoAll sawing time—
7 minutes per opening, 3½ hours
Saw speed—140 FPM.
Saw used—3/16", 12 pitch,
A temper, R tooth

DoAll Saving .....16½ hours

Former method was End Milling, using a $4.00, ¼" end mill, of which 3 or 4 were broken on each die.

DEFENSE PROGRAM CALLS FOR DoALL SPEED

The DoAll cuts out internal and external shapes from any metal up to 10" thick in 1/2 to 1/6 the usual time. Replaces shaping, milling and lathe work with enormous savings of labor and metal.

Used in 30 countries in large and small die making plants, by manufacturers of all kinds of tools, metal parts, equipment, motor cars, airplanes, also by ship builders, arsenals, railroads, etc.

Let a factory trained man bring a DoAll to your plant and show you what it can do for you.

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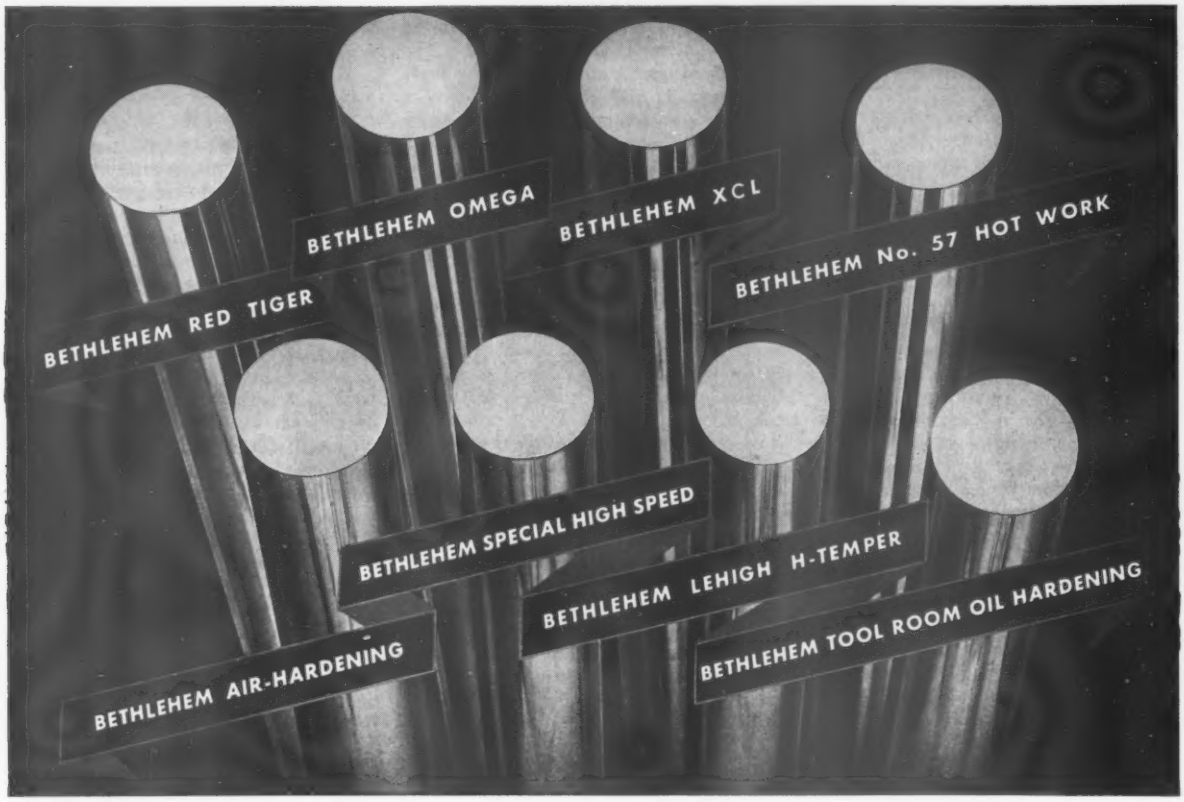

8 TOOL STEELS YOU SHOULD KNOW

Here is Bethlehem's complete 8-steel tool kit. Each steel is thoroughly shop-tested. Each handles a wide range of metal-working jobs. Taken together, these 8 fine tool steels will handle 90 per cent of all the work in any plant.

1. Omega—A shock-resisting tool steel suitable for pneumatic chisels, calking tools, heading tools, punches and so on.

2. XCL—A carbon tool steel that is adapted to virtually every application where quality carbon steel is used.

3. No. 57 Hot Work—A tool steel with outstanding heat-resisting qualities, No. 57 retains its strength and hardness through all temperature ranges up to dull red heat.

4. Lehigh H-Temper—A high-carbon high-chromium die steel used in punches, taps, master tools, slitting cutters, forming and bending rolls and a host of similar applications. Especially adapted for use in long-run dies and tools.

5. Special High Speed—A general purpose 18-4-1 high-speed steel recommended for lathes, planers, boring mills, slotters, shapers, drills, hobs, and many other similar applications.

6. Tool Room Oil Hardening—This steel offers good non-deforming qualities and is unusually tough and hard. Recommended for general-purpose die work.

7. A-H—Bethlehem Air Hardening (A-H) die steel possesses remarkable non-deforming characteristics, and can be economically heat-treated and handled.

8. Bethlehem Red Tiger—This steel, while relatively new, has already set performance records in some of America's leading plants. Recommended for heavy rough cuts or fine finishing operations. High hardness coupled with lack of brittleness, means that Red Tiger is an excellent general purpose steel.

Why not try the 8-steel tool kit in your own shop? Its use reduces inventories, simplifies heat-treatment and improves the quality of finished products. Write to Bethlehem Steel Company, Bethlehem, Pa., for complete details on the money-saving 8-steel assortment.

BETHLEHEM STEEL COMPANY

COOPERATIVE EDUCATION

(Continued from preceding page)

through their practical experience in industry, discover aptitudes and interests of which they were not previously aware.

The test of any process is the product which it produces. Industry is not organized primarily for altruistic purposes, though it is perhaps at least as generous and unselfish as many of its critics on this score. But business and industrial companies would not continue for many years to employ students on the co-operative plan with the attendant inconveniences of labor turnover, work programs, reports and the like, if there were no compensating benefits in the end. What they do get is the opportunity to select particularly promising young men and train them to fit into their own organizations. For many seniors, graduation is merely the date after which they remain continuously on the job; for the employer, it is the date after which he may expect to have the continuous service of an employee who will be satisfactory to him. There is no sudden change and no uncertainty. Both employer and employee know the best and worst about each other. As a result of this fact, graduate placement is not, under normal conditions, a serious problem in co-operative institutions, since a very large proportion of the graduates are immediately accounted for by absorption into the industries with which they have worked as students. As for those not so placed, the experience record and employers' reports are generally of value to visiting personnel officers and prospective employers. This does not mean to imply that all co-operative graduates are immediately located in highly paid responsible positions. "The poor we have with us always" and they constitute the difficult placement problem in any college. But it is obvious that the close association of college and industry in the co-operative plan greatly facilitates the placement of graduates. The plan, in fact, is not continuously workable if industries do not find a large proportion of the graduates suitable to be included in their organizations.

The most recent development under the co-operative plan at the University of Cincinnati is the Graduate Department of Applied Science in the College of Engineering and Commerce. The Master's degree and Doctorate are offered in programs of two and four years normal duration. The unique feature of this course is that instead of first training the student and then seeking a place for him, the position is obtained first and the student is trained to fit it. Industries interested in securing young men for their research departments propose a definite problem, or at least a specific field, and provide fellowship for a pair of students selected for their previous training, aptitude and other necessary qualities, and acceptable to both the college and the employing company. The students alternate on a six-months' basis and generally work on different phases of the same research problem which must be of a fundamental character. Advanced courses in mathematics, physics and chemistry make up the academic program with the addition of some special techniques often not included in graduate work.

Administrative Problems

This roseate picture of the co-operative course should not be left without painting in some of the thorns. Those who have had most experience with this scheme of education would be the first to admit that it does not solve all educational problems and, in fact, raises many new ones inherent in its organization and administration.

There are, to begin with, many administrative problems which cannot be solved by the usual academic formula. These problems are greatly complicated where the co-operative plan and the regular full-time plan are employed in the same institution, and since it it necessary to build up a co-operative organization gradually in the well defended territory of the traditional course, the new organization may find itself most hampered when it needs most help.

The co-operative plan, in order to be sucessful, must have a favorable industrial environment. While it is desirable to develop a considerable geographical spread of territory in which students are placed on employment, it is obvious that most of the students must remain in a localized industrial area in order to keep down the expense of commuting and to facilitate the work of coordination. The industries in this area must be varied and should include both large and small organizations in order to provide breadth of experience and insure as high a degree of stability as possible. Furthermore, the organization in which students are employed must be sympathetic to the co-operative plan, and it is not sufficient that the general manager merely put his initials on an order permitting college students to be employed. Superintendents, foremen, and the workmen themselves must approve the idea. This is not because co-operative students require special attention or privileges. All that is expected is that they shall get an even break; but there is industrial inertia as well as academic inertia encountered in making any departure from traditional practice.

The work of the Coordination Department, which is vital to the co-operative plan, is complex and difficult. Besides the detailed work of placement, personal interviews with students, visits to the plants, the conducting of coordination classes and the reading of work reports, there are varied problems all the way from labor relations to parental dissatisfaction with which the coordinator must deal.

It is not to be expected that all students will thrive under the co-operative system. Some will be weeded out for the same lack of ability or inadequate preparation which would have caused their failure in a full-time course, but in addition to these there are others who cannot adapt themselves to the co-operative plan who often succeed very well when they transfer to the full-time program. The percentage of these students is relatively small, but their educational problem deserves consideration. Some individuals do very well when working steadily at a deliberate pace, but break down completely when overloaded. For students of this type, the intensive academic program is not only a serious, perhaps a dangerous hazard, since it may result in discouragement or even nervous breakdown, but it is not educationally efficient. Such students often make excellent shop records and give other indications of engineering ability, and failure to make a good showing under the co-operative plan should never be taken as indication that the individual will not succeed—no more, in fact, than that the co-operative plan is not workable. Both of these judgments, strangely enough, are sometimes rendered in the same case.

Another type of misfit is the boy who makes an excellent college record and cannot hold a job long enough to get on the regular payroll. He, too, is a rare exception but a difficult problem. In some instances, his difficulty is temperamental or psychological. Often the trouble can be discovered and sometimes remedied. It is not infrequently a matter of social immaturity. For students of this type, the four-year course may again be indicated. It is standard practice to advise them to go into teaching.

Effects of Depression

It would be useless to pretend that fluctuations in the business cycle do not affect the co-operative course and cause difficulties. During the depression following 1929, there was unemployment among the engineering students at the University of Cincinnati. Except for a few weeks it did not exceed thirty-five percent. When it became evident that the business barometer was to remain low for a considerable time, a program was arranged so that students who so desired could complete the last three years of the academic program in two years of full-time attendance. By this arrangement, unemployment was kept down to such a point that relatively few students who were dependent upon their earnings were forced to leave school for financial reasons. Those who took the condensed program and who, therefore, lacked the work experience required for the technical degree were given the bachelors degree upon graduation,

(Continued on following page)

and were later given the technical degree when they presented evidence of having done acceptable work after graduation.

In spite of these difficulties the cooperative plan has been adopted in some thirty-five technical and business institutions of collegiate grade and with some changes in philosophy as well as modification in practice has been applied in Liberal Arts courses. In use in the high schools of New York City for twenty-five years, where it was introduced under the personal direction of the late Dean Herman Schneider, it has in recent years made rapid expansion in secondary schools particularly in the south and south-west.

It seems evident that industry must take some part in the education of engineers, either by taking young college graduates and expecting to train them through personal but unorganized direction, or by setting up definite apprentice programs such as will be found in many companies, or in a few instances by founding what are in effect colleges within the industry, or by participating in a co-operative program with some technical institution. These methods are neither interchangeable nor mutually exclusive; all four are sometimes used by the same industrial organization. But college and industry perform two separate and distinct functions in the training of the engineer. Each is particularly qualified to do its own part in the total educational program and it is rarely, if ever, practical or advantageous to place this entire program either within the college or within industry. But what is highly important and seriously needed is the realization that the training of a young engineer must result in an integration of theory and practice, however, this may be achieved. It is encouraging to note the increasing interest of both educational and professional societies in this problem, for it is one of many evidences of growing professional consciousness among engineers and it will be an important factor in raising the standards of the profession.

Should Industry Assume the Burden of Special Eaucation

III. INDUSTRY'S POST GRADUATE COURSE

by W. S. DOWMAN
Assistant Director of Sales and Office Personnel
The Goodyear Tire & Rubber Company

GOODYEAR'S successful method of training young men in the rubber industry is the culmination of 27 years of the practical and progressive application of sound principles of personnel training. Our Training Programs have played an important part in Goodyear's history and they have no exact counterpart anywhere in American industry. Our first training group, the Production Squadron, came into existence in 1913, because P. W. Litchfield, then newly made Vice President and Factory Manager, felt a need for a definite program to initiate the newcomer into our business. In 1915 a similar type of training was extended to the Engineering Department, called the Engineering Squadron and in 1925, our Apprentice Training Program was started. Inasmuch as all these training programs are somewhat inter-locked in this talk, I will explain briefly the operation of each.

Production Squadron

In 1913 twenty men were picked to form the first Production Squadron and were given a three year factory course, working through every Production Department, mastering all major operations. This gave the company a group of trained men who could be thrown into any department to balance inequalities in output. Since that time each year a group of men have been selected for this course of training. Men having this broader knowledge of production have provided excellent material for supervision, so many Squadron men have become foremen and superintendents.

While at the outset men were picked entirely from the shop, the Squadron

Tireman Dowman
Training played an important part.

came to attract men of higher education and in recent years a large number of college trained men have been included in the plan. A Squadron man may be given assignments after his first year in any department of the company, and so some in contact with practically every phase of the business. As a result of this training he can more intelligently find the line of work where he will fit best. Applications for admission far exceed the number of men taken. Often as many as 5000 men are interviewed, from which a class of from 75 to 100 is selected. A percentage of practical men from the factory is included in each class, the rest coming from the Universities.

The wages of men, plus the cost of teaching them the large number of operations they are required to learn, both in the factory and class, runs into quite an item of expense. Goodyear therefore has an immediate financial investment in each student, which grows very rapidly throughout the course. There are two major means of justifying this expense: Through a service called "balancing production", and advancement in the organization.

There are but two guarantees made to a Squadron man. 1. He will be paid a minimum monthly income of $115.00 or more if he earns it at piece work, so long as he remains on the Squadron. 2. If he makes good, he will be given consideration for promotion if and when opportunities arise for men of his qualifications. He is not assured of remaining on the Squadron unless he makes an outstanding

(Continued on following page)

POST GRADUATE COURSE

(Continued from preceding page)

showing in all three phases of the Squadron work, Production, School, and Gym.

The course is of three years duration and includes a minimum of 41 weeks of factory assignments. For the remainder of the time or until transferred to a permanent assignment each man is used on work which best furthers his particular training and meets the need of the company.

The Squadron man will be given work in the shop only as the factory operates. The factory departments operate on a 24 hour basis and work both six and eight hour shifts. He will be given approximately an equal number of assignments on each of the shifts, shift changes being made monthly. Since one of the objectives of the Squadron is the balancing of factory production, he may be called upon at any time to perform any operation in the plant for which he is qualified. There is no guarantee of shift or job for any definite period.

Each student is required to make an honest effort to produce all he can while learning all the many operations which make up the factory course. If this is not done, the cost in connection with this training course cannot be justified. Goodyear is therefore interested only in young men, who, for the opportunity of learning this fast and growing business, are willing to go out in the plants and by hard, honest effort make as rapid progress as possible in mastering the many operations.

THIS IS NOT ALL

The papers presented here by no means constitute the entire symposium on the subject "Should Industry Assume the Burden of Special Education?"

Those in attendance at the Cincinnati meeting were pleased when an unscheduled paper was introduced into the symposium. Mr. Louis Biehler, Chairman of the Los Angeles Chapter of the A.S.T.E., presented a paper outlining the training program of the Lockheed Aircraft Corporation.

George Schiele, Chief Inspector and Member of the Board, Cincinnati Milling Machine Company, discussed the papers presented briefly and then there was a general discussion from the floor.

Unfortunately space limitations make it impossible to include these papers in the present version of the symposium. The papers here included do provide a general cross section of the material which was presented.

The Squadron school curriculum is a practical one, tying directly in with factory work and covering subjects relative to Goodyear's business. Class-room work is required two hours per week. In addition to the class-room work each man is expected to prepare his school work on his own time and those who neglect to do so cannot be carried on the Squadron.

School grades are given by Goodyear Industrial University instructors monthly. A school average of 92 or above for the quarter rates A. 82 to 91 inclusive rates B and 75 to 82 inclusive rates C.

The physical training program provides that each man shall attend gym classes once each week. Competent instructors are in charge of regular gym classes held for men on all shifts.

Meetings are held regularly and in these meetings, policies are explained and matters of interest to Squadron men are discussed. Questions are invited so that meetings quite regularly develop into round table discussions. Several times each year these meetings are addressed by Goodyear executives.

School, gym and meetings are held before or after working hours depending upon the shift worked and the trainees are not paid for the time spent in this

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Precision Grinding at 18,000 R. P. M.

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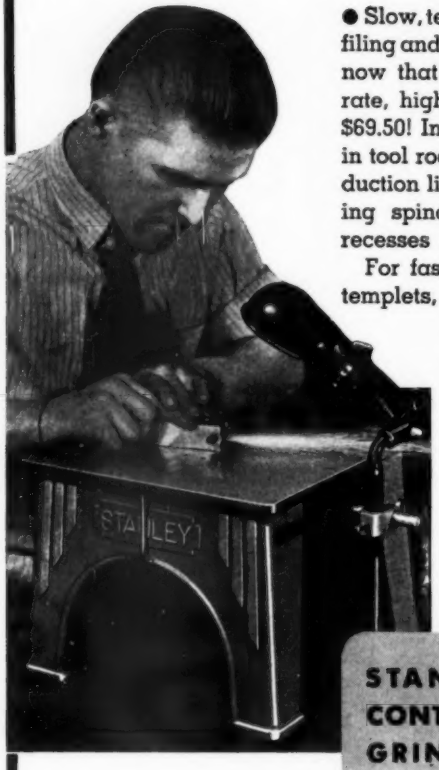

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For fast production, for making templets, grinding dies, finding blanks, correcting hardening distortion, this machine is ideal. ⅓ h.p. Universal motor. Ask your Stanley distributor for demonstration, or write for literature. Stanley Electric Tool Div., The Stanley Works, 149 Elm Street, New Britain, Conn.

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"COST LESS PER YEAR"

Crucible's
REX HIGH SPEED
Steels
...Are The Overwhelming Choice of America's Leading Tool Manufacturers

...And You Get The Same Uniform High Quality When You Buy Rex High Speed Steels!

TODAY'S accent is still . . . and will continue to be . . . on QUALITY—DEPENDABILITY—UNIFORMITY . . . all the more necessary in light of today's accelerated production tempo. Leading manufacturers who are making huge quantities of tools like the above continue to rely on REX HIGH SPEED STEELS to meet their most exacting specifications. They depend on REX grades to maintain the high reputation of their products, and speed up their customers' production.

Whether or not you are similarly equipped to make exhaustive tests on incoming steel, you can safely rely on REX HIGH SPEED STEELS, because *all* REX brands are produced and inspected in our mills before shipment to conform to these exacting tool makers' standards. This is your assurance of dependability. And, the next lot you buy will be just as good, for the uniformity of REX HIGH SPEED STEELS is a tradition.

There are several types of REX HIGH SPEED STEELS . . . each outstanding for definite performance . . . and stocked in your local Crucible Warehouse or authorized distributor. Your Crucible "practical-man" will gladly survey your machining operations and give you specific recommendations. His vast background on the "Full-Range" of Specialty Steels is at your disposal. *Folder TS300 free on request.*

CHECK REX'S UNIFORM PERFORMANCE ON TOOLS LIKE THESE:

Broaches	Lathe Tools	Shaper Tools
Crowning Tools	Milling Cutters	Taps
Cutters	Planer Tools	Threading Dies
Drills	Punches	Tool Bits
Form Tools	Reamers	Wood Working Tools

CRUCIBLE STEEL COMPANY of America

Specialty Steelmaker to INDUSTRY

CHRYSLER BUILDING • 405 LEXINGTON AVENUE • NEW YORK CITY
BRANCHES, WAREHOUSES AND DISTRIBUTORS IN PRINCIPAL CITIES

MAKERS OF HIGH SPEED, TOOL, STAINLESS, ALLOY, PRODUCTION AND SPECIAL PURPOSE STEELS

POST GRADUATE COURSE

(Continued from preceding page)

manner. In addition to the above each man is required to turn in a report each quarter on some subject of his own choice pertaining to some phase of his training.

Opportunities open to Squadron men who do outstanding work include Production Supervision, Time Study, Efficiency, Research and Development, as well as Sales and General Office Administrative work.

Engineering Squadron

The Engineering Squadron operates along similar lines to the Production Squadron, it being a three year course of shop and study along the engineering lines. At the present time, applicants for the Engineering Squadron must either have completed four years in an Engineering school with a degree, or have attained the status of a journeyman. The shop training program is different for technically trained men than for journeymen but in each case requires a minimum of 72 weeks. For the remainder of the course each man is used on shop or office work which best furthers his particular training and meets the need of the Company. The work assignments for the journeymen tend to eventually lead them into Engineering Production Supervision and the work assignments for technically trained men tend to lead toward Engineering Staff Work.

For Journeymen		For Technical Men	
Assignment	*Weeks*	*Assignment*	*Weeks*
Lathe	8	Lathe	16
Shaper	4	Shaper	16
Milling Machine	6	Milling Machine	16
Boring Mill	6	Boring Mill	16
V T L	4	Bench & Floor	16
Drill Press	4	Drill Press	16
Bench & Floor	4	Inserts	4
Tools & Temp.	4	Welding	4
Inserts	4	Maintenance	4
Welding	4	Carpenter Shop	4
Maintenance	4	Pipe Shop	4
Carpenter Shop	4	Electric Shop	4
Pipe Shop	4	Tin Shop	4
Electric Shop	4	Powerhouse	4
Tin Shop	4	Const. Conv. Eng.	4
Powerhouse	4	Heat & Vent. Eng.	4
		Steam Eng.	4
		Drafting	4
		Elect. Eng.	4
		Eng. Control	4

Since 1936, due to the decentralization of our manufacturing and the erection of new plants in other parts of the country, the men coming direct from college with engineering degrees have been given one year's training in one of our outside plants, either in Gadsden, Alabama or Jackson, Michigan, after which they are transferred to our main plant in Akron and there their training continues with definite transfers being effected in our Akron organization.

Machinist's Course

The Goodyear Apprentice Machinists course is open to high school graduates who are mechanically inclined and who wish to receive training as machinists, electricians, pattern makers, blacksmiths, sheet metal workers or garage mechanics. Since the greatest need exists at Goodyear for machinists, by far the greater number of boys selected are those who desire training as machinists. Our experience in the past has been that there are more than enough suitable candidates available from our local community and from among the sons of our employees. It has been our custom to give these boys preference. When a class for this group is to be selected, the instructors in our school draw up a mental or academic test which each applicant is required to take. The examination which we give covers spelling, reading, grammar, arithmetic and algebra, and enables us to select boys for this group strictly on the basis of merit. The applicant must receive a grade of at least 75 in each subject, and the group is made up of those who make the highest grades. After meeting these requirements, each applicant must pass our physical examination. The course of training for each trade includes a maximum period of four years of shop and gym training and three years of academic study.

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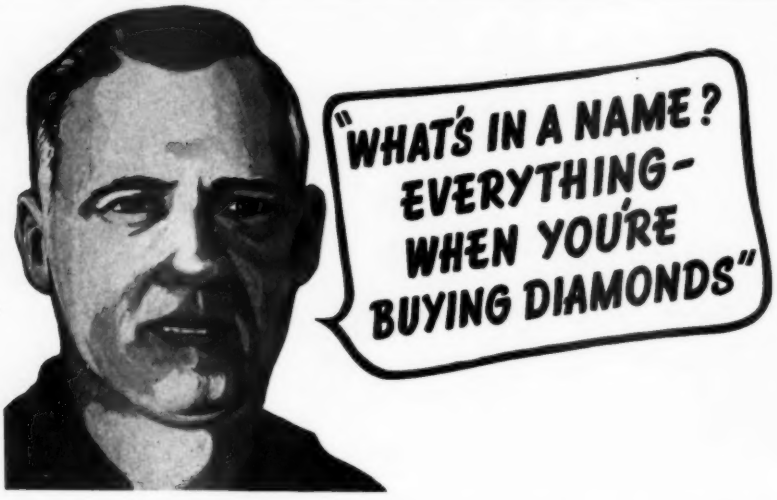
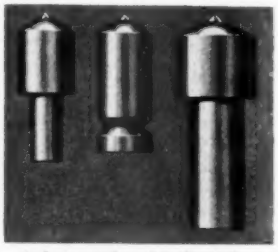


"I've been using diamond tools for many years now and it's been my experience that it pays to deal with a company that has a background. For the past few years we've been getting our tools from Anton Smit & Co., Inc., an old concern that has been in the diamond-importing and tool-making business for more than thirty years. They know their diamonds."

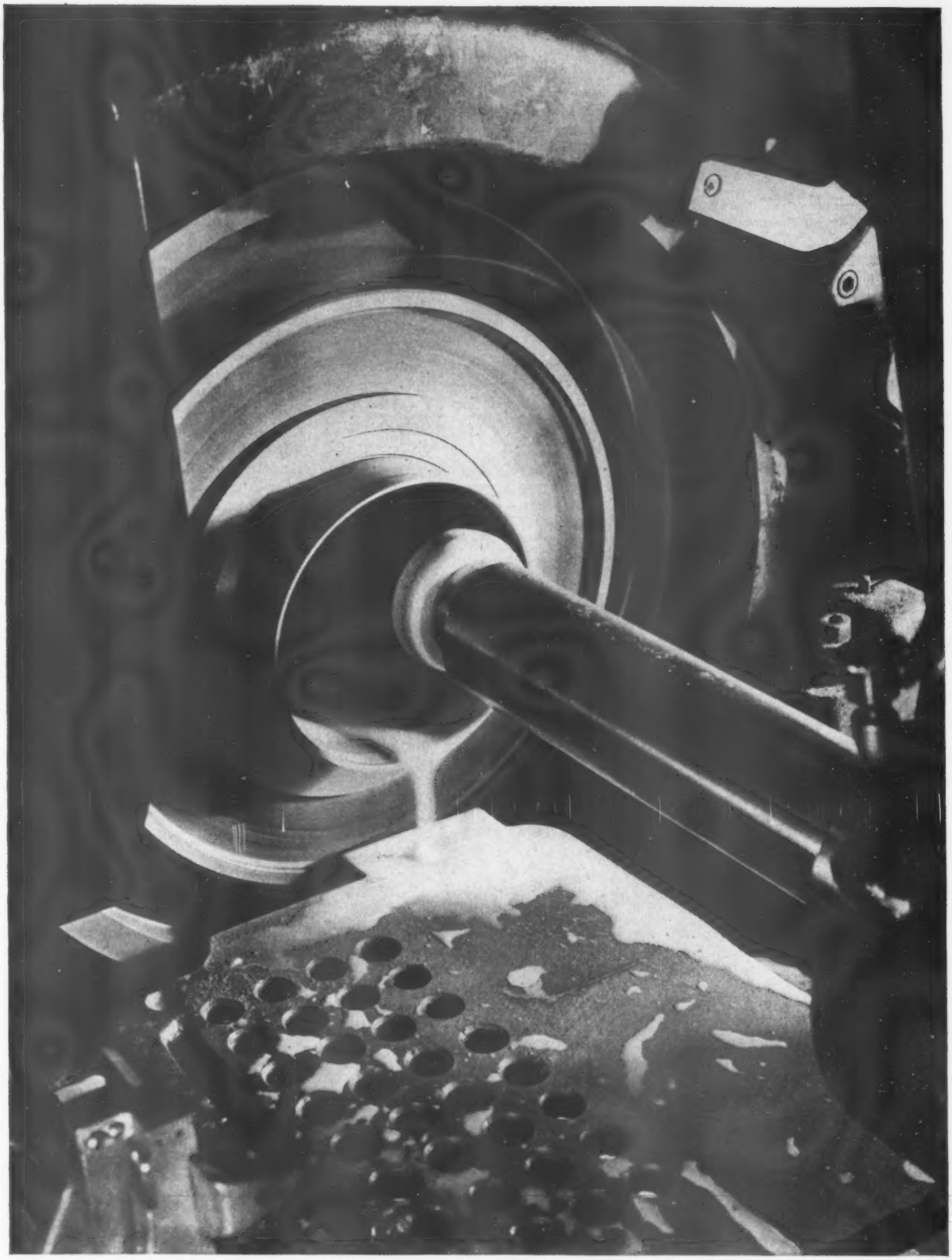
With the growing demand for faster and more accurate cutting of new, hard materials, diamond tools have become popular for a wide variety of operations in industry. Diamond-tipped boring, milling and turning tools are used for precise fast work, especially on very hard or abrasive materials such as hard steels, rubber, fibre, plastics, etc.

For more than thirty years Anton Smit & Co., Inc., have been prominent importers of diamonds and manufacturers of diamond tools, also controlling the output of important diamond mining concessions. They carry extensive stocks of Bortz, Carbons, Ballas, Crushing Boart, Splint, Points, Powder, etc., in all sizes and qualities for various purposes, selected by experts. Parcels will be gladly submitted for examination upon request, either by mail or personal call. Send for illustrated folder and prices.



Left to right: Landis Nib, Norton Nib, Cincinnati Nib

ANTON SMIT & CO., INC.
24 STATE ST. (near Battery) NEW YORK, N. Y., U. S. A.



Mirror finish is obtained on the bore of airplane engine cylinders without honing when they are ground on Bryant Internal Grinders. Greater accuracy, finer finish, and higher production from new Bryant Grinders will write a new cost story in *your* plant on *your* production — start today by sending prints to the BRYANT CHUCKING GRINDER COMPANY, Springfield, Vermont. for a complete cost analysis.

POST GRADUATE COURSE

(Continued from preceding page)

The school work requires attendance of four hours per week, preparation of home assignments and a grade of at least 75 in each subject to be determined by recitation and examination.

Each boy is assigned to the type of training which he has designated as his preference. The machinists training course is set up for the purpose of training machinists for Goodyear. It is distinctly different from one that would be designed to train men to operate single machines such as lathes or boring mills. A major part of the engineering work of Goodyear is purely maintenance work and to be satisfactory as a mechanic one must have an accurate knowledge of Goodyear machinery and method.

Some of the shop courses are:

For Machinists (Assignment and weeks minimum) Lathe 35, Bench 29, Horizontal Mill 12, Vertical Mill 12, Boring Mill 10, Vertical Turret Lathe 6, Planer, 4, Shaper 6, Drill Press 5, Machine Design 10, App. Shop Tool Room 6, Eng. Dept. Tool Room 5, Maintenance Dept. 6. (Assignment and weeks maximum) Maintenance Problems 4, Miscellaneous 26, Specialization 26.

The Pattern Makers' Course includes: (Assignment and weeks minimum) Pattern Records & Storage 16, Varnish and Finish Patterns 4, Pattern Maker's helper 40, Machine Work 40, Bench Work 90, and Miscellaneous 12 weeks maximum.

The shop training course for Blacksmiths includes: (Assignment and weeks minimum) Blacksmith's Helper 37, Operate small steam hammer 9, Helper-large steam hammer 13, Helper-heat treating 14, Acetylene welding 14, Electric welding 17, Atomic welding 17, Blacksmithing 65, and Miscellaneous 16 weeks maximum.

The Sheet Metal Workers' Course covers the following: (Assignments and weeks minimum) Help Mechanics & check jobs 32, Bench work 62, Welding 10, Layout work 50, Machine work 10, and Miscellaneous 38 weeks maximum.

Our apprentice school is well equipped and has adequate supervision to guide the boys in the work which they are required to do. The engineering department furnishes the machinist school with orders for parts and small machines so that their training is of a practical nature. All types of small work are sent to them from the simplest to some of the more complicated projects. In this way, the beginners have an opportunity to work on the machines and material which they can handle and the more advanced apprentice has an opportunity to use some of the more intricate machinery. Those to be trained as electricians, pattern makers, blacksmiths, sheet metal workers or garage mechanics are assigned directly to the departments in which these functions are carried on and work with the regular department men. The supervision of the G A M contacts daily with the supervision of the departments in which these apprentices are working and in that way are able to keep in close touch with their progress. Apprentices work the same number of hours weekly as the departments to which they are assigned. If they are working in the school shop, they work the same number of hours as the average worked in the Engineering Production Division. At the present time the apprentice school is only operated two shifts a day because we cannot work boys under 21 years of age on the night shifts. Apprentices are required to bank their earnings in excess of their minimum rate but not to exceed $3 per week. They are also required to purchase the text books necessary for their academic work and the tools necessary for their shop work. A definite schedule of tool purchase is mapped out for them so that they will acquire tools wisely. Machinists require tools to the approximate value of $100 during their course.

Rating System

The Production Squadron, the Engineering Squadron and the Goodyear Apprentice Machinists work under a merit rating plan whereby each man may increase his minimum rate as much as 10c

(Continued on following page)

TUNGSTEN CARBIDE TIPPED
SPECIAL TOOLS

● Make your present equipment do more and better work with Super Carbide Tipped Tools:

Ask
FOR OUR NEW
Price List
40-A
ON
LOW PRICED
STANDARD
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See
Catalog
No. 40
ILLUSTRATING
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FOR—
BORING
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FACING
MILLING
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DRILLING
SPOTFACING
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BROACHING
FORMING
WEAR PARTS

SUPER TOOL COMPANY
21650 HOOVER RD. DETROIT, MICH.

GEAR CHECKING on the SINE-LINE

LEAD CHECKER

Checks spiral lead rather than helix angle—avoiding errors due to depth at which reading is taken. All leads from 6 in. to infinity, right or left hand by simple setting of the sine-bar.

Ask for Bulletin 1204-40a.

Faster checking. Faster set-up. No master rolls, cams, or discs to change. Greater accuracy by eliminating errors in changing masters, in lead screws, etc. In 'Sine-Line' checking equipment, the first cost is the last. Laboratory accuracy. Production checking speed.

Also: Hob Checkers & Gear Speeder.

INVOLUTE CHECKER

Sine-bar setting provides proper ratio between single master disc and base diameter of any gear. Also checks tooth spacing. Available in various column heights for different capacity ranges as to gear size.

Ask for Bulletin 1124-40a.

Lead and Involute Checkers can be furnished with or without recorder.

MICHIGAN TOOL COMPANY

7171 E. McNichols Road — Detroit, U. S. A.

POST GRADUATE COURSE

(Continued from preceding page)

per hour. Merit rates can be established only after the full program of factory, gym and school work has been carried on at least three months. Revisions are made quarterly unless some special justification warrants a change in any particular case. In such cases, changes may be made at any time. The merit rating plan is designed to give recognition to merits of two kinds. One which is dependent upon the individual's present worth to the company and the other which is dependent on his possibilities for the future. Numerical values are given for each grade, for each item. The total of these values is the individual's "merit rating." Each rating has a corresponding wage value for each quarter of service.

The Items on which men are graded and the maximum points allowed for each are:

Health 3, Character 3, Ability 3, Cooperation 3, Thrift 3, Initiative and aggressiveness 3, Leadership 3, Production 12 and School 6.

The ratings are made in three grades only, outstanding, average and poor, designated for convenience as A, B and C respectively. For A, in any given item, one received the maximum number of points; for B, two-thirds of the maximum; and for C, one-third. Ratings in the first eight items are made quarterly by the Squadron supervision or the supervision of the Apprentice Machinist group. No merit rating credit is allowed for a scholastic average below 75. If one receives a rating of 19 points or less out of the possible 39 he is paid the minimum rate and his position on the Squadron or the G A M is precarious. If he receives a rating of 20 to 26, he is paid the normal rate which is 5c more than the minimum and is the pay of the average man. If he receives 27 or 28 points he is paid 1c more than the normal rate.

Each graduate of one of these training groups receives a service pin and a diploma. In addition, the best graduate each year receives the Litchfield Award of Merit being presented with a suitable gold medal as a token of appreciation of his achievement. This is an honor that is much coveted and the rules for the selection of the best all-round graduate require the consideration of the candidate's performance during the entire training course, in the factory, in the school and in the gym.

All through the training period an increasing rate schedule is followed and each man in addition can, by outstanding performance, obtain his full merit rate or a portion of it. It should be understood, however, that those on these training courses spend a large proportion of their time working on a piece work basis and since our wage scale in the rubber industry is high, it is not at all unusual for the trainees to make considerable more than their minimum rate.

In this paper I have discussed particularly the training programs which we have for the apprentice or the technically trained young man and I have not discussed other training setups which we have for those going into work of a non-technical nature. We have attempted to shape our training programs to fit our own particular needs and have made numerous changes as conditions have warranted them.

We are fortunate in having a management that is completely sold on the types of training which I have outlined to you and this I am sure you can all appreciate makes our job of training much easier.

NEXT MONTH

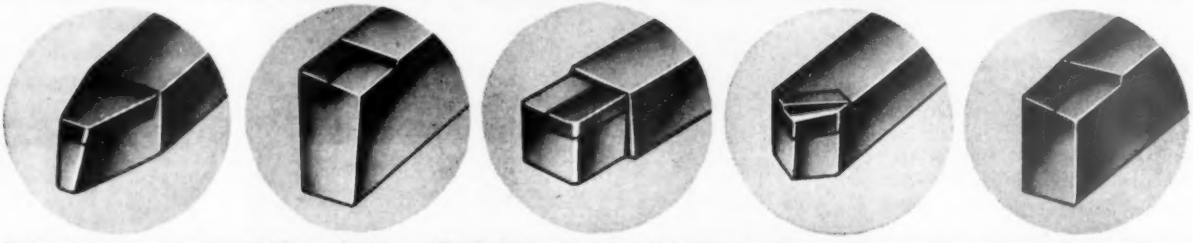
A Symposium on

"GEAR FINISHING"

Presenting an analysis of Shaving and Lapping and Grinding Processes of Gear Finishing

Prepare FOR DEFENSE DELIVERIES

WITH Reduced Cost CARBIDE CUTTING TOOLS by TECO



Today there is a way to step up the productive output of your machines, and make faster deliveries, without adding to overhead — *specify TECO CARBIDE Cutting Tools NOW AT REDUCED COST.*

Responsible machinists in the nation's key plants report production increases of 75% and more where TECO Tools are doing the machining job. That's because modern TECO cutting tools are super high-speed — machine steel 4 to 11 times faster than customary high-speed steel.

Check these cost-cutting features you enjoy with TECO Carbide Cutting Tools:—

- Machines all steels including steel hardened to 550 Brinell.
- Machines steel with amazingly little tool wear.
- Machines steel without previous annealing.
- Roughs and finishes in one cut.
- Reduce floor-to-floor time as much as 30%.
- Increase tool-life as much as 200%.
- Give 10 to 50 times as many pieces per grind.

Directly, or indirectly, National Defense is going to place heavy demands on your plant facilities. Now is the time to prepare. Step up the productive capacity of equipment on hand . . . obtain maximum performance from new machine tools . . . keep machining costs within economical limits with TECO Carbide Cutting Tools. Why not send in the production requirements of your next job? We'll be glad to work with you.

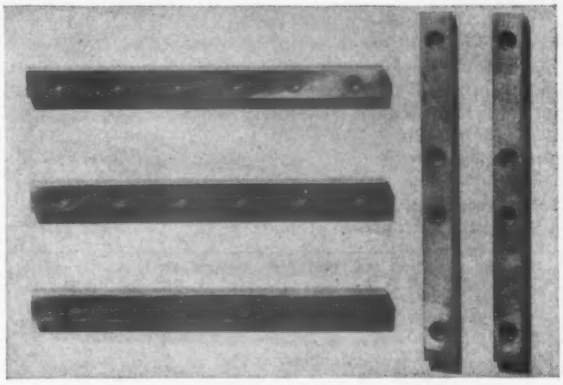
There is a standard grade of TECO METAL to meet the characteristics of almost any machinable material. For information, address:

TUNGSTEN ELECTRIC CORP., 570-39th ST, UNION CITY, N. J. • *Br. Off.: 2900 Euclid Ave., Cleveland, O.*

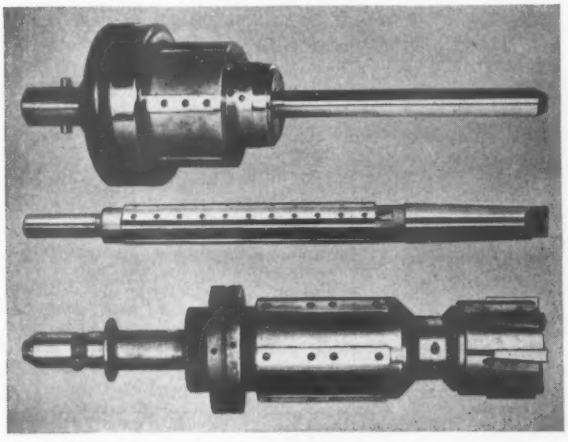
TECO CARBIDE CUTTING TOOLS *pay dividends*

HAYNES STELLITE WEAR STRIPS Assure Accuracy and Long Life for Boring, Driving, and Pilot Bars . . .

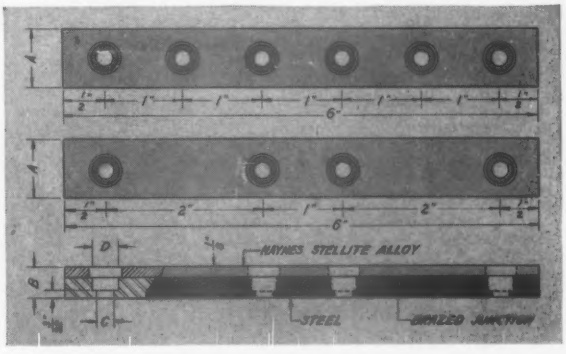
A HAYNES STELLITE wear strip consists of a thin casting of Haynes Stellite alloy brazed to a mild steel base, with screw holes for attachment. The high resistance to abrasion and heat which is inherent in Haynes Stellite alloy assures accuracy and long service life for boring, driving, and pilot bars fitted with such wear strips. Haynes Stellite wear strips can also be used as wearing plates for jigs and fixtures, for indexing stops or locks, and for permanent gauging surfaces, sliding T-slot surfaces, sliding ways, and other surfaces subject to wear.



Standard Haynes Stellite wear strips are available in two styles, Type 1 (6-hole) and Type 2 (4-hole). Both styles are 6 in. long, and each style is made in five sizes —varying in width and thickness.



Shown here are three installations of Haynes Stellite wear strips. Their high resistance to abrasion and heat keeps the bar accurately aligned, eliminates galling, and reduces pilot maintenance to a minimum. The screw method of attachment permits adjustment by shims whenever it is necessary to maintain exact clearance.



These cross-sectional views show the construction and dimensions of Haynes Stellite wear strips. The screw-holes are accurately spaced, and the standard dimensions permit the interchangeability essential to economical use.

Shown above is a variety of bars with Haynes Stellite wear strips. These wear strips are adaptable to special lengths, as they can be cut to size or used end to end.

Haynes Stellite specialties are widely used for high resistance to abrasion, corrosion, and heat. Haynes Stellite engineers are thoroughly experienced in production work, and will show you how Haynes Stellite products can help reduce costs. For information write Kokomo, Indiana, or the nearest district office—Chicago, Cleveland, Detroit, Houston, Los Angeles, New York, San Francisco, Tulsa.

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York, N. Y. UCC Kokomo, Indiana

HAYNES STELLITE TRADE MARK

Red hard, wear-resisting alloy of cobalt, chromium and tungsten

The words "Haynes Stellite" are a trade-mark of Haynes Stellite Company.

New Literature

Of Interest to the Tool Engineer

(22) Rivitor

The Rivitor Automatically Feeds and Set Solid Rivets. The Tomkins-Johnson Company, 624 N. Mechanic Street, Jackson, Michigan. 8 pp. This bulletin goes into detail in describing the riveting operation and includes specifications for the various model rivitors.

(23) Countersinks

Severance "Chatterless" Countersinks, Bulletin 12-E. Severance Tool Mfg. Co. 1522 E. Genesee Ave., Saginaw, Michigan. 2 pp. This bulletin describes both the standard and heavy duty types of Severance countersinks.

(24) Illinois Tool Catalog

Illinois Tool Works, Catalog E. Illinois Tool Works, 2509 N. Keeler Avenue, Chicago, Illinois. 292 pp. A valuable reference handbook as well as a catalog.

APPRENTICE COURSE

for Tool and Die Makers?

One of the recognized bottlenecks in national defense is an acute shortage of skilled tool and die makers. Are you conducting a training course or planning to start one to help solve this urgent problem in your plant? If so, here is a modern, up-to-date text that makes teaching easier.

TOOL STEEL SIMPLIFIED

By Frank R. Palmer
Assistant to the President
The Carpenter Steel Company
315 pages — 205 illustrations
$1.00 postpaid in U.S.A. Elsewhere $3.50

Now in use in many vocational and trade schools, and in apprentice courses conducted by industrial plants. Elementary enough to meet the urgent need for a good text for apprentice training. Practical enough to be helpful in advancing the skilled tool maker. Contains hundreds of practical suggestions that can be quickly applied in daily work to get improved tool performance. Send coupon below for free descriptive leaflet, or order a book for examination.

READ WHAT SCHOOL HEADS SAY

. . . Simple and easy to read. Contains useful information which commends it to technical men, semi-technical men, and men in the shops who want to improve their ability to make the best use of tools.
Prof. Bradley Stoughton
Dept. of Metallurgical Engineering
Lehigh University

. . . Valuable textbook for apprentices and journeymen, and an equally valuable handbook for tool designers and others concerned with the use of tool steel.
J. B. Chalmers
Director of Training School
The Yale & Towne Mfg. Co.

. . . have read and re-read the book. Became absorbed in finding out and learning so many things I never knew before. Chapter 17 on quenching is worth the price of the book . . . will need 45 copies for classroom use.
F. E. Laverty
Worcester Boys' Trade School
Worcester, Mass.

. . . Consider it one of the very finest books that our local schools of vocational and adult education might use in training of apprentices in machine trades.
R. L. Welch
Supervisor Industrial Education
State of Wisconsin

SEND Now

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Reading, Pa.

Send me tree leaflet describing contents of "Tool Steel Simplified."

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STREET _____ CITY _____

☐ I enclose $1.00. Send copy of book postpaid.

If the postcard in this issue is used in requesting a copy be sure to include firm name and position. If the request is sent direct use your company letterhead.

(25) Carboloy Grinder

Chip-Breaker Grinder Bulletin No. GT-121. The Carboloy Company, Inc., Detroit, Michigan. This bulletin covers the use of the new Chip-breaker grinder with cemented carbide tools designed for machining steel.

(26) Friction Clutches

Johnson Friction Clutch Catalog. Carlyle Johnson Machine Company, Manchester, Conn. 10 pp. Contains revised data covering Standard and Super type expanding ring friction clutches.

(27) Milling Cutters

Paraform Cutters for Your Milling Machines. Barber-Colman Company, 213 Loomis Street, Rockford, Illinois. 12 pp. The new name which has been coined and given to the Barber-Colman Cutter is explained in this bulletin which shows a sketch of the tooth form and tells how the teeth are formed.

HOW TO ORDER

Booklets listed in these pages or information on new equipment may be obtained by using the post card bound in this issue. Merely fill out one coupon for each item desired, being sure to print plainly and to include position and company. Mail the card to us and you will receive the information desired at once.

(28) V-Belt Data

Goodrich V-Belt Data Book. The B. F. Goodrich Company, Akron, Ohio. 170 pp. This book gives alphabetical listings of belt requirements for a wide variety of applications.

(29) Aero-Thread System

Engineering Standards and Technical Information on the Aero-Thread Screw Thread System, Bulletin T-1a. Aircraft Screw Products Company, Inc., 25-12 41st Avenue, Long Island City, New York, N. Y. 16 pp.

(30) Press Brake Bulletin

Clearing Press Brakes, Bulletin B-1. Clearing Machine Corporation, 6499 West 65th Street, Chicago, Ill. 6 pp. Illustrations, features, and specifications of the new Clearing Brake Type Bending Presses.

(31) Pistons & Cylinder Heads

Aluminum Pistons and Aluminum Cylinder Heads. Aluminum Company of America, Pittsburgh, Pa. 48 pp. This booklet discusses types of pistons, piston materials, and piston finishes, as well as cylinder heads.

(Continued on following page)

MORSE

THERE *IS* A DIFFERENCE

TWIST DRILL AND MACHINE COMPANY

NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

NEW LITERATURE

(Continued from preceding page)

(32) Resistors, Rheostats, Tap Switches

Ohmite Catalog No. 40. Ohmite Manufacturing Company, 4835-55 Flournoy St., Chicago, Illinois. 96 pp. This catalog contains a great deal of engineering data, reference, tables, dimension drawings, illustrations, etc. If the post card in this issue is used in requesting a copy be sure to include firm name and position. If the request is sent direct use your company letterhead.

(33) Die Metal Bulletin

Meehanite, the Metal for Cast-to-Form Dies. Meehanite Research Institute, 311 Ross Street, Pittsburgh, Pa. 4 pp. This bulletin includes a table of properties and a variety of applications and performance records.

(34) Arc Welding Manual

Practical Lessons in Arc Welding. The Hobart Brothers Company, Box EW-65, Troy, Ohio. 218 pp. 50c. These lessons in arc welding are used in the Hobart Welding School and in other trade schools throughout the country.

(35) Pumps

Warren Coolant Pumps. Warren Steam Pump Company, Inc. 4 pp. Description, specifications, and performance curves of the Coolflo pumps.

(36) Tool Room Chart

Kennametal Tool Room Chart. The McKenna Metals Company, 600 Lloyd Avenue, Latrobe, Pa. This chart includes an inch rule and a protractor for measuring tool dimensions and angles. It also shows a chip breaker design on Style No. 11 Kennametal tool for turning bar stock and forgings and an efficient tool design for a facing tool for turret lathes.

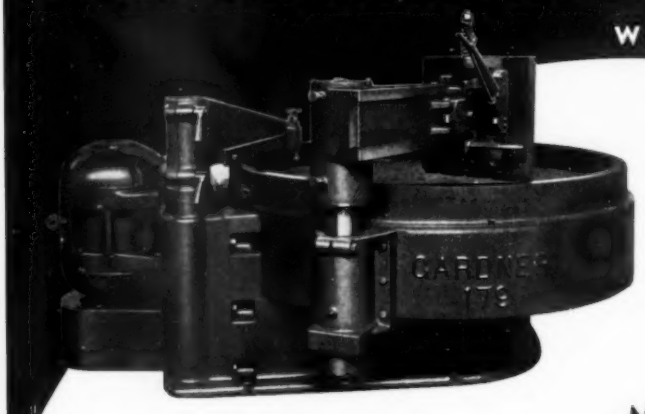
(37) Presses

Senior Presses by Colonial. Colonial Broach Company. 6 pp. These hydraulic presses range from one to ten ton capacity and are designed for general purpose use.

(38) Hobbing

Hobbing Machine Special Units and Accessories. Barber-Colman Company, 213 Loomis Street, Rockford, Ill. 4 pp. Several new special units that are now offered for the No. 3 Standard and No. 3 Precision Hobbing Machines are listed in this bulletin.

For unusually LARGE flat surface work—



this NEW 72" GARDNER Horizontal Grinder!

LARGE gear cases, pump bases, boiler sections, furnace fronts and similar flat surface parts, are daily being handled with remarkable economy, on Gardner Horizontal Grinders.

Built in 18", 30", 53" and 72" sizes, this type of tool is exceptionally versatile, with an almost unbelievably wide work-range. The new No. 179-72" unit shown here, is not only capable of surfacing parts ranging from 3" diameter up to some 60" in length, but it also embodies several improved principles in design and construction. Chief of these are its new, louver-type removable guard ring, and its efficieft swinging bar-type dresser.

The Hand-operated Swinging Work Table makes it possible to grind two surfaces on a casting, to a definite relation; the machine is NOT limited to free-hand grinding.

Get figures on the GARDNER—GRINDING of YOUR large flat surface jobs—

WRITE FOR BULLETIN 1201 COVERING THIS PRODUCTIVE 72" MACHINE!

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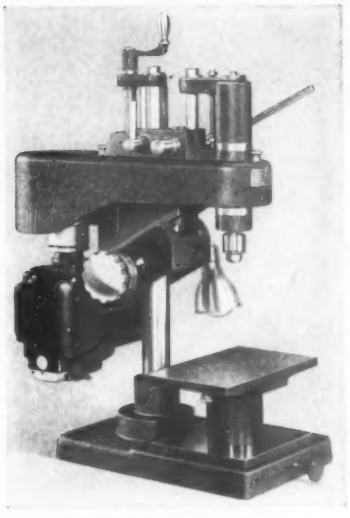
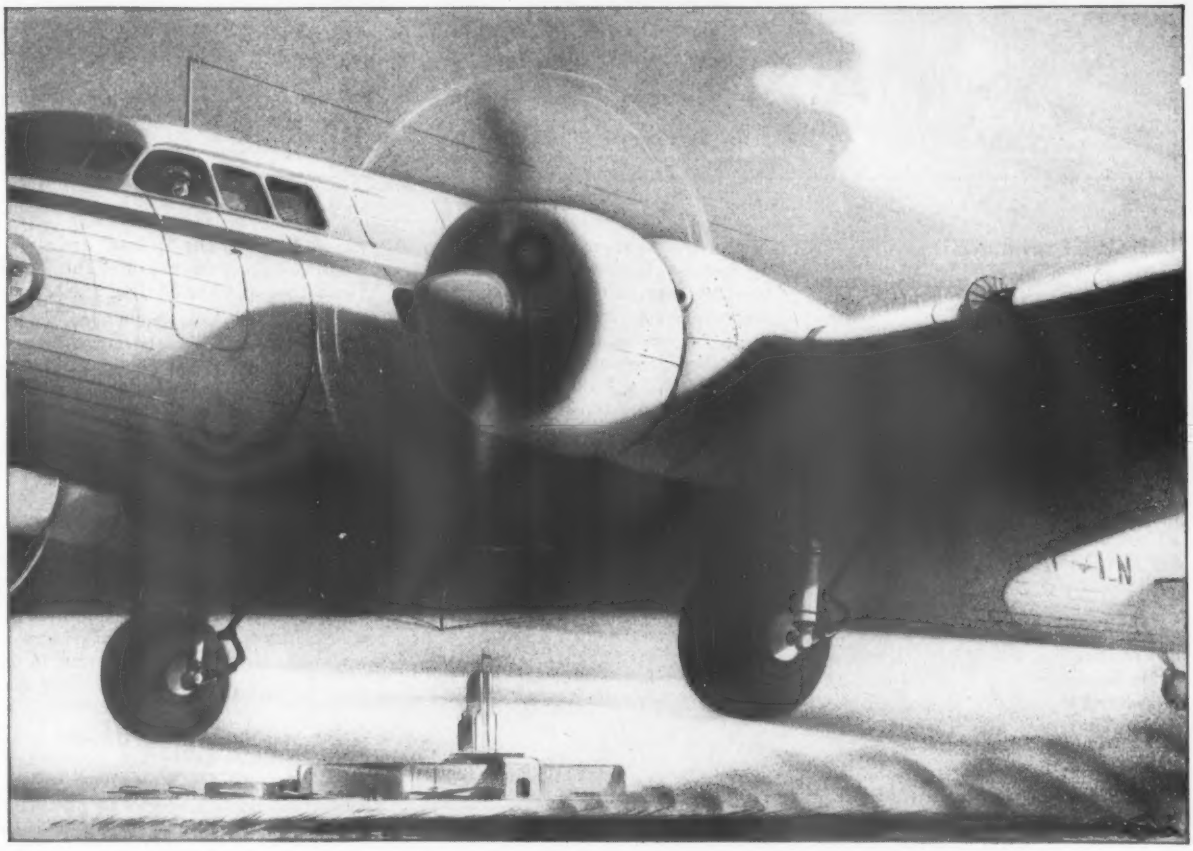
442 East Gardner Street . . . . . Beloit, Wisconsin, U. S. A.



(57) Hamilton Drilling Machine

A new Varimatic Super Sensitive Drilling Machine is offered by the Hamilton Tool Company, Hamilton, Ohio. The complete speed range of the machine is from 840 RPM to 9,300 RPM with a constant speed of 1,725 RPM motor providing the power. A graduated speed dial on the speed changing hand wheel shows the speed at which the spindle is operating.

The drilling unit is self-contained, swings radially on the columns, and locks to any position. The 6½" vertical adjustment of the drilling unit of the Varimatic is accomplished by means of an elevating screw; the convenience of this feature will be appreciated where vertical adjustments occur frequently.



WHERE "GOOD ENOUGH" WON'T DO

There are no "unimportant" parts in an airplane engine. Efficiency and dependability demand perfect performance all along the line. Consequently the only standard for selecting materials should be ability to meet the requirements.

Nickel-Chromium-Molybdenum and Nickel-Molybdenum oil hardening steels are being chosen for many engine parts such as crank shafts, pins and accessory gears because of their demonstrated capacity for doing their jobs. Not only do they develop the necessary strength and toughness, but also the requisite hardness, and they machine in the fully heat treated condition.

Thus they give the engine manufacturer confidence in the performance of the parts and help keep his production costs within reasonable limits.

Complete technical data about the various Molybdenum steels will be found in our book, "Molybdenum in Steel". This book will be sent free on request to executives and production heads.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Molybdenum Company
500 Fifth Avenue New York City

MOLY

» » A. S. T. E. DOINGS « «

By IRWIN F. HOLLAND

Detroit Chapter No. 1

The Fall session of technical meetings got off to a big start at Hotel Fort Shelby with one hundred eighty-seven members and guests attending the dinner and about three hundred being present for the technical session. From the record-breaking attendance at our first Fall meeting, it looks like a banner year for the Detroit Chapter.

The old timers were present in no small numbers. We were especially glad to see all the first officers of the Society including Joe Siegel, Bill Smila, Bill Fors and Al Sargent.

Floyd Eaton made a very impressive announcement regarding the semi-annual at Cincinnati.

Mr. Roebuck of the U. S. Secret Service introduced the movie "Making Money & Know Your Money." The picture was well received as well as some very interesting stories by Mr. Roebuck.

The highlight of the evening was a very interesting talk of War Torn Europe by our past President, Bert Carpenter. From the questions asked by the audience, it was quite apparent that the talk was well enjoyed by everyone.

Cleveland Chapter No. 3

With special emphasis placed on the technical side of the October meeting, 175 members and guests of the Cleveland Chapter thronged the Hotel Allerton Ballroom on Friday, October 14, to hear two outstanding speakers lecture on "Plastics and Their General Use in Industry."

Dr. I. M. Currie, head of the Vinylite Research Division of National Carbon Company, and S. D. Hildebrand ("pinch hitting" for W. B. Hoey unavoidably detained in New York) of Bakelite Corporation were the two principal speakers, and their respective topics were Vinylite and Bakelite. These are the trade names applied by Union Carbide and Carbon Corporation to the two outstanding commercial plastics developed and promoted by its subsidiary organizations.

The speakers traced the development of industry from 1875, when celluloid was first discovered, to its present high state of development, featuring the use of many different compounds. They also refer to the phenomenal growth of plastics straight through the last depression period which augurs well for the future of this industry.

Through the use of a plastics comparator chart, Dr. Currie clearly illustrated the relative strength and weaknesses of the various plastics in performing certain functions and their resistance to the various elements. By practical demonstrations, the two speakers further clarified the main differences between Vinylite and Bakelite, outlined their general uses in industry and illustrated the various types of molds used in producing the finished plastic product and enumerated many of the current uses of plastics.

They spoke about the overstressed advertising of Plastics particularly those derived from the soya bean. After Mr. Hiledbrand's lecture, a short question period was held and a lively discussion ensued. Following the discussion, a movie entitled "The Fourth Kingdom", relating to the principle of scientific research in the field of plastics, was shown with Mr. Hildebrand "ad libbing" the sound effects.

Milwaukee Chapter No. 4

A turnout of 80 members and 34 guests for the meeting on October 10 was very gratifying to say the least, since most shops in the Milwaukee area are operating two and some on three shifts a day.

The speaker of the evening was Mr. Forrest T. Ellis, who is in charge of special sales and engineering work on boring machines at the Heald Machine Company. Mr. Ellis gave an excellent talk on "Borizing—The Precision Finishing of Surfaces". He explained the origin of the term "Borizing". He spoke at length on the type of tool used, the spindle construction, the machine itself and the quality and accuracy obtained.

We have always felt quite proud of equipment that held bore sizes or milled surfaces within .0002 of the exact figure; yet here was a speaker showing us by slides and finished parts on display, a quality of finish that is almost a mirror finish and held to between 1½ and 2 micro inches—this accuracy and quality of finish being obtained every day in large shops on mass production parts.

The hotel management donated a door prize, which was carried off by Ernst Collin. Whether it was carried off internally or externally we haven't found out yet as Ernie surely disappeared hurriedly and completely surrounded.

Francis J. Trecker, the Assistant Chief Engineer at Kearney & Trecker Corporation, will be the speaker on the evening of November 14. He will address the Chapter on "A New Technique in the Art of Tool and Die Milling" and show a colored talking movie on "The Rotary Head Tool and Die Milling Machine."

Mr. Trecker is exceptionally well adapted to speak on the latest developnemt in tool and die milling, as he has been in full charge of the sales and engineering of the "Die Miller" ever since its development.

Hartford Chapter No. 7

On Monday evening, October 7, the Hartford Chapter was given a real treat in the person of Mr. J. W. Barker, Dean, School of Eng. of Columbia University.

Mr. Barker gave an outstanding lecture on Vocational Guidance which was indeed a timely subject for everyone in this day of tool men shortage. A lively floor discussion followed.

This was the first meeting held in the Trinity College auditorium and judging from the splendid attendance and the favorable comment, it may be possible to again meet there. The lecture was preceded by a splendid dinner in the college dining hall. Leadership of meeting was ably conducted by the meeting chairman, Mr. W. H. Gourlie.

Our next meeting will be held November 4 at the Hartford Gas Company Auditorium preceded by a dinner at the City Club. We will then hear a talk on Longer Tool Life by Mr. C. A. Hooper, Tool Supervisor of the General Motors Corporation, Chev. Flint Division. Movies and slides will illustrate and the meeting will be under the chairmanship of Mr. Geo. M. Pearse, Jr.

Pittsburgh Chapter No. 8

Pittsburgh chapter opened its 1940-1941 series of meetings with two outstanding programs for its first two meetings, thanks to Bill Owen, who is again taking over the job of Program & Meetings Arranger, par-excellence. Both of these meetings dealt with the topic most widely discussed by all Tool Engineers, National Defense. Major Al Williams was the distinguished speaker at the first meeting, and what he had to say about Aviation in the U. S. should be brought home to all Tool Engineers. Mr. H. G. Eisele, Editorial Committee Chairman, suggests that all the boys write to Major Williams and ask him to write an article for all of them to read in the TOOL ENGINEER.

The Grand Opening which was held

(Continued on following page)

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HIGH CARBON • HIGH CHROME
DIE STEEL

Applications

COINING DIES
COLD BENDING DIES
FORMING DIES
LAMINATION DIES
STAMPING DIES
THREAD ROLLING DIES
SHEAR BLADES
PUNCHES · GUIDES

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For Maximum Abrasion Resistance

LATROBE has developed G. S. N. Die Steels for applications where toughness and the ability to withstand wear is an essential requisite. In G. S. N., the high carbon, high chrome content helps promote longer life and minimum distortion. Its properties make G. S. N. available for a wide range of uses where the ultimate in abrasion resistance is required.

Write for bulletin giving technical data on G. S. N. Die Steels.

Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES *and* PLANT ·· LATROBE · PENNSYLVANIA

A.S.T.E. DOINGS

(Continued from preceding page)

at the Edgewood Country Club was a huge success, with almost 200 turning out. There were 40 of the boys who managed to get out and play in the Turf-Wreckers-Handicap Tournament. All the boys were disappointed in not getting the Major there for the Club-Swinging, which was not quite possible, for Major Williams was racing against time in his "Gulf-Hawk" in order to be there at the time set for dinner.

The second meeting covered the other side of the National Defense Program in which Major Jon Swauger covered the manufacturing of armaments and gave with gestures an exhibition of the Garand Rifle. Many timely topics were discussed, and one of the most important was "On to Cincinnati", and Pittsburgh was strongly represented there as it has always been in the past.

The *Arts-Walter-Membership-Member-Get-A-Member* combination is functioning as a smooth unit and the membership is steadily climbing despite many of the boys leaving for other parts of the manufacturing districts.

HOW TO INCREASE STAMPING PRODUCTION 500% TO 900%

without increased Labor, Factory Space, or Overhead!

8 OPERATIONS, COMPLETE PER STROKE. 4,800 completed shells produced per hour by one machine. .050" steel, 1¾" draw.

MACHINE GUN BELT LINK. Produced complete per stroke to precision limits, one Dieing Machine replacing a number of presses formerly required. Various links are produced, at production as high as 125 completed links per minute.

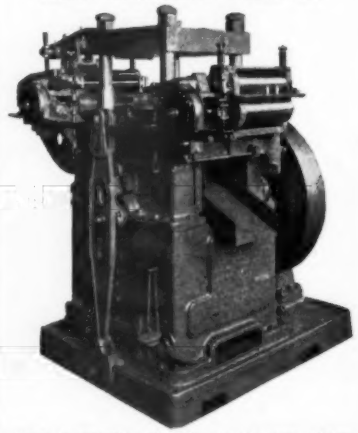
Industry is straining to make up for lost time, to boost production to the utmost. Install Dieing Machines in the spaces occupied by conventional presses, and watch production soar!

Producing Huge Quantities of Munitions Stampings

Because they produce complete per stroke, complicated parts often requiring accuracy to .0002", Dieing Machines are today making the vast majority of numerous items such as machine gun belt links, cartridge clips, mechanical time fuse parts, bomb parts, etc.

Not only on munitions, but on all types of stampings, these amazing machines are enabling a given plant unit to produce 5 to 10 times as many finished parts!

This machine does it!



Made in capacities of 10 tons to 300 tons, Dieing Machines produce 1 to 20 COMPLETED parts per stroke at speeds up to 600 s.p.m.

Henry & Wright Dieing Machines

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HENRY & WRIGHT MFG. CO.
Hartford, Conn.

Toledo Chapter No. 9

The Toledo Chapter held its October meeting at the Toledo Yacht Club on Wednesday, October 9. After a very delicious chicken dinner at 6:30 p.m., Mr. Lloyd A. Kelley, Vice-Chairman, urged all to attend the semi-annual meeting at Cincinnati. He then introduced Chairman Arthur Bok, who in turn introduced the speaker of the evening.

Mr. James Longwell, Chief Engr. of Carboloy Company talked on "Steel Cutting with Carboloy," and illustrated his lecture with lantern slides which showed different applications of coolant. Mr. Longwell's lecture was followed by a forum, during which the following high lights were noted:

"One of the principal problems in the use of Carboloy tools is the built-up-edge, resulting in tool failure. Increase in the cutting speed prevents the built-up-edge. A starting speed of 300 ft. per min. is recommended to be increased if possible.

"Application of coolant is very important. Individual pipes for each tool, applying the coolant under pressure at the point of contact with tool and work should be used. Applying coolant from below point of contact is successful where heavy chips are involved. Proper application prolongs life of tool and cools chips so they break up more readily.

"Recommends grinding tools for free cutting with 1/32" rad. on point. A mechanical chip breaker or one ground in the tool should be used."

The second speaker of the evening was Mr. Arthur S. Kuhn of the Spicer Mfg. Company, who discussed high speed surface broaching with particular application to a shock absorber wing shaft manufactured at their plant. Mr. Kuhn mentioned the high production obtained by the use of high speed broaches in alloy steel forging shafts and made particular reference to the fact that close tolerances required the set-up to be independent of the temperature of the machine.

Attendance at this meeting was 70.

Twin City Chapter No. 11

The first meeting of the season was attended by fifty-one members at Wold Chamberlain Field on September 18. Dinner was served in the Administration dining room.

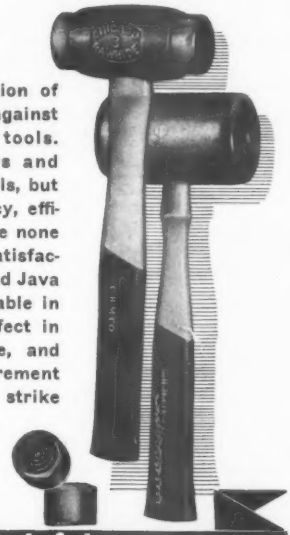
The business meeting was cut short in order to allow as much time as possible for the tours of Northwest Airlines' shops. After a tour of the instrument shop, the radio shop, and the hangar, the Link Trainer was then seen in operation, checking a pilot on instrument flying.

A drive was taken to Holman Airport in St. Paul for a tour of the Machine Shop, the Maintenance and major overhaul departments, at the same time hearing a talk given by Mr. K. O. Larson,

(Continued on following page)

FOR...

"SETTING-UP"
DIE MAINTENANCE
ASSEMBLY



Careful work — the protection of valuable equipment and dies against damage — requires good tools. Chicago Rawhide Hammers and Mallets are not only good tools, but from a standpoint of accuracy, efficiency, and economy there are none better — none that are as satisfactory. With faces of compressed Java Water Buffalo Hide (replaceable in the hammers), they are perfect in resiliency, hardness, balance, and accuracy . . . for every requirement where effective blows must strike "softly." Ask your supply house for a demonstration — now.

CHICAGO Rawhide MFG. CO.
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This New Combination

CENTER GRINDER and DRILL PRESS

Gives You 2 Machines for the Price of 1

To change from a Center Grinder which dresses the angle accurately and assures accurate grinding on successive operations to a sturdy, accurate Drill Press of ½-inch capacity—simply loosen one bolt, raise dresser up full height and swing out of way. Floor type, can be furnished in any length, complete with motor, diamond and grinding wheel. Four speed V-belt drive to handle any range of work.

$197.50

F.O.B. DETROIT
Standard grinder, 40" between centers, complete with 110-220 volt motor.

Write for Bulletin No. 11

DALZEN TOOL & MANUFACTURING CO.
511 Leib Street Detroit, Michigan

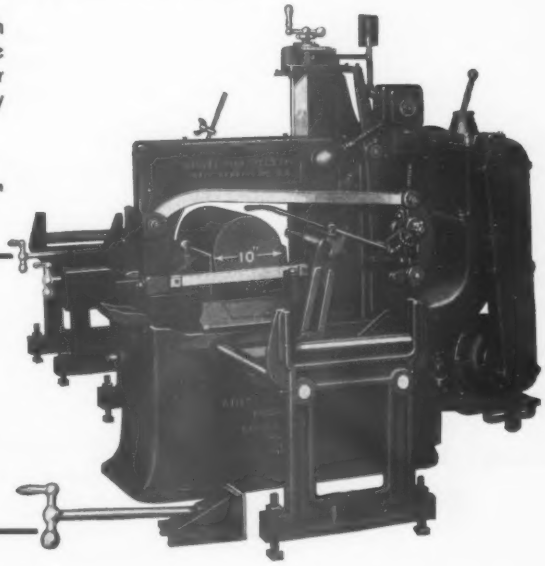
10"x10" Capacity

and more pieces cut-off from bar per hour than by any other method.

Strictly production machine tools built for continuous high speed operation, MARVEL 9A Saws automatically feed single or nested bars, accurately measure and cut-off thin slices or long lengths at extremely high speeds. Stop automatically when completing desired number of pieces.

MARVEL

No. 9A Production Saws



Full ball-bearing construction throughout. Combination positive-and-friction feed. Depth gauge will raise blade at any desired depth of cut, (for notching or slotting). Blade always horizontal, cuts on draw stroke, raises out of cut on fast return. Rigid saw frame is reciprocated by crank lever or shaper lin' action (33 1/3% faster than ordinary crank action).

Serves as both production and fast, accurate, general purpose saw. Automatic bar push-up can be disengaged at any point, a miscellaneous cut made, and production work resumed immediately.

Buy from your local distributor.
ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. Chicago, U.S.A.

A.S.T.E. DOINGS

(Continued from preceding page)

Chief Engr. of Northwest Airlines on general aviation topics.

This was a very interesting and instructive meeting and thanks were extended to the Northwest Airlines and their various department heads for their cooperation in making this possible.

Rockford Chapter No. 12

The Rockford Chapter held its monthly meeting combined with the Reserve Officers' Association of that Rockford Chapter, at Hotel Faust Thursday, October 3. Chairman Hank (Ruehl Co.) presided.

Dinner was served at 6:30 to 150 members and guests. The dinner speaker was Lt. Col. A. R. MacKechnie of the U. S. Army who explained in detail the Conscription Act. A military film was shown entitled "Attack Aviation" and lasted for about 20 minutes.

The speaker of the evening was Dr. John J. Caton, Director of Chrysler Institute, who spoke on "Common Sense in Education." Dr. Caton spoke for over two hours and had his audience sitting on the edges of their seats. We recommend this brilliant speaker to all Chapters.

Some of the high lights brought out in Dr. Caton's talk were:

1. Not to take men into our organization who do not fit.
2. Few Tool Engineers reach the highest places in industry because of the lack of a well-rounded education, particularly in reference to personality and culture. Without doubt, Tool Engineers are authorities on tools and special machinery, but in many cases their progress is limited by this lack—in other words, diamonds in the rough, no polish.
3. Dr. Caton stressed the fact that America depends on us more today than ever before, and it is our chance of a life time to be recognized as essential to the American way of living.

Our Editorial Chairman, Gordon E. Williams of C. H. Besly & Co., Beloit, Wisconsin, would like to get more technical articles from Chapter 12 for publication in the TOOL ENGINEER.

Baltimore Chapter No. 13

The second meeting of our 1940-41 season came, tarried, and went, and in its wake, left our members the richer for three distinct reasons. In the first place, who can deny the satisfaction that lingers with the memory of a worthy festive board, and good fellowship? Secondly, we were fortunate in our contact with the genial Mr. Roy T. Wise, Consulting Engineer of the Union Twist Drill Company. Third, after Mr. Wise left, we were all 'wise' to the 'Possibilities of Cutting Tools', which was the subject of Mr. Wise's lecture.

The energetic chairman of our Entertainment Committee, Mr. E. A. Iseberg, made a special announcement regarding our Annual Dance, to be held on November 9 in the Hotel Emerson. On that evening, the Tool Engineers of Baltimore will forget all about drill jigs, while they indulge in that type of jig that is executed on the dance floor, and boy how they can forget.

New York-New Jersey Chapter No. 14

The New York-New Jersey Chapter held its October meeting in conjunction with the American Society for Metals at their headquarters, The Essex House, in Newark, N. J. on October 14. Before the main speaker of the evening, Chairman Wally Gray, invited once more members and guests to participate in full force at the planned Dinner Dance of the Chapter's to be held on November 15 at Meadowbrook, N. J. where music and entertainment will be offered by Jimmy Dorsey and his orchestra and a late dinner at 12 p.m. Mr. Gray also mentioned the pending semi-annual meeting of the National Society at Cincinnati, Ohio, the week of Oct. 17, 18, and 19, pointing to

(Continued on following page)

GAIRING LOCK

Gair-Locking Milling Cutters provide cutter heads accommodating a maximum number of blades with a rigidity that produces solid tooth action. Blades are quickly and accurately set, lock positively, seat perfectly. They provide ample chip clearance and are economical because they last longer.

The Gair-Locking all-purpose blades used in the mills illustrated here are applicable to all types of cutting tools from single point boring bars to complicated milling cutters—*and they save money wherever used.*

Our experienced engineering staff and the facilities of our modern plant are here to serve you.

Use them!

Write today for your copy of Gair-Lock Folder No. 302.

The Gairing Tool Co., Detroit, Mich.
In Canada, Hi-Speed Tools Ltd., Galt, Ont.

SPECIALISTS IN FINE CUTTING TOOLS FOR 24 YEARS

BARNES
HYDRAULICS

TYPE 75 HYDRAULIC UNIT COMPLETE WITH NECESSARY VALVES. READY TO INSTALL FOR RAPID TRAVERSING AND FEEDING MACHINE ELEMENTS.

HYDRAULIC CIRCUITS ENGINEERED TO MEET INDIVIDUAL REQUIREMENTS

GEAR AND PISTON PUMPS
FEED AND TRAVERSE UNITS
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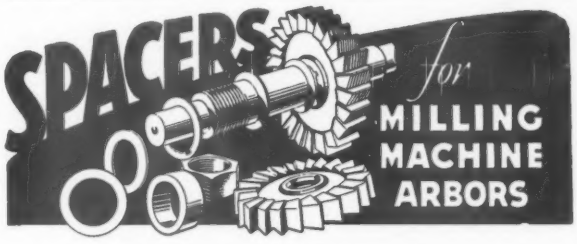

DE-STA-CO ARBOR SPACERS

They save time in setting up cutters on milling machines and other tools. Will help you get work out quicker. Low in cost, but high in savings. Standard stock sizes from .001" to .125" thick. Also specials up to 4.000".

TRIAL ASSORTMENT

Enough spacers for average use on one machine, sent for $1.00. Give arbor size when ordering.

Price list No. 70 sent free

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FREE SAMPLES
BRISTO SOCKET SCREWS
NOW!

Before you forget it, mail in the coupon below. It will bring you a handy assortment of Bristo Socket Screws,—the same kind of screws specified in so many manufacturing plants for superior holding power under every operating condition. Try them at our expense, on your own work, in your own way . . . that's all we ask.

SET TIGHTER . . . *STAY* TIGHTER

Thanks to the fluted socket head into which the wrench slips easily and locks snugly, you will find that a Bristo can be set up *tight*—and will hold, no matter what the service. Non-splitting, non-shearing, a Bristo Screw has more than enough strength for a *safe* set,—a set you can always depend on!

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Give Bristos your *toughest* test. The free trial offer coupon brings these screws to you by return mail, along with a copy of informative Bulletin 838V. The Bristol Company, Mill Supply Division, Waterbury, Conn.

QUICK BRISTO FACTS

Lock-tight socket head,—won't split, shear, round out, jam or strip. Set tighter with less effort. No loosening under vibration. Take wrench without fumbling or skidding. **Designed by engineers for engineers.**

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Send me sample Bristo Socket Screws in the following sizes_____
Also send me Bulletin 838V. (State Sizes)

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A.S.T.E. DOINGS

(Continued from preceding page)

the many interesting plant visits in the Cincinnati area, the papers to be discussed at the sessions and the banquet.

The speaker of the evening was Mr. James Gill, Chief Metallurgist of the Vanadium Alloy Co. and President of the American Society for Metals, who gave an unusually interesting and instructive talk on "Modern High Speed Steels", their compositions, properties and applications, supported by many charts.

A number of questions from the large audience, readily answered by Mr. Gill, indicated the lively interest in the subject matter. Refreshments were served after the meeting.

Rochester Chapter No. 16

The boys gathered around the dinner table at Todd Union, University of Rochester, Wednesday, October 16, and after finishing their last cup of coffee, adjourned to the Lower Strong Auditorium for serious business.

Vice-Chairman Lucas opened the meeting by giving the floor to Educational Chairman Joe Gray. Joe had ten guests with him, all chosen as representatives of the Mechanics Institute student body. Joe introduced all the boys to the crowd, and it goes without saying, that they had earmarks of fellows interested in this all-important subject of Tool Engineering.

As the evening's feature attraction, Mr. Frank Spencer, Tool Engineer of Gleason Works was introduced and chose as his subject, "Production Draw Die Work". Mr. Spencer built his story around a deep radiator draw job. He emphasized the difference between short run work as common in this area and automotive mass production, particularly in respect to die construction, sequence of press operations and maintenance problems.

Mr. Spencer went into the problems of deep draw, pointing out the importance of die and punch clearances as well as radius of die edges and the effects of improper "flow" edges. The problem of straightening and trimming as well as secondary blanking and extra drawing were dealt with in a most interesting manner.

Joe Schick of Delco entered the discussion as well as Brook Hobson of Mixing Equipment. Leonard Weber of Stromberg-Carlson placed before the speaker a number of his problems, going into considerable detail concerning the troubles which have been encountered.

Vice-Chairman Lucas and Secretary Milton Roessel had to run away early to catch the train for Cincinnati. The meeting, however, continued for some time after their adjournment and was terminated by Joe Gray, acting as Chairman.

St. Louis Chapter No. 17

St. Louis Chapter held its regular monthly meeting on Thursday, October 10, at the Melbourne Hotel. After dinner, which was well attended, the business session was carried through, with emphasis being placed on the semi-annual meeting at Cincinnati. The lecture-demonstration entitled "The Magic of Communication" was most ably carried out by the following members of the Southwestern Bell Telephone Company of St. Louis; Mr. Weldon Canfield, Mgr. Mr. Kenneth Kraft, Advertising Assistant, and Mr. G. Morton Cummings, Engr. From the demonstration of a model of Dr. Alexander Graham Bell's first telephone, they carried on through the successive developments in this field. This included demonstrations of the photo-electric cell, and transmission of music over a ray of light. As discussions in this field carry you into the stratosphere of mathematics, the members were glad to settle with a vote of thanks to the speakers.

Dayton Chapter No. 18

The Dayton Chapter enjoyed a good start on the Season's Activities at the Hotel Gibbons, September 9. There were fifty-five members and guests present. Mr. Albert Schnairman, District Manager of the Warner & Swasey Company, was the speaker of the evening who gave a very

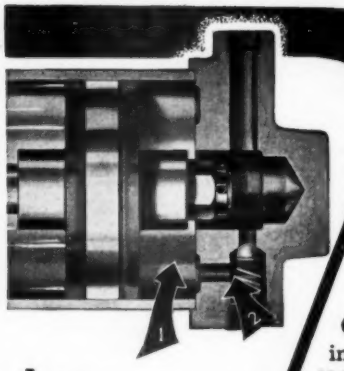
(Continued on following page)

NOPAK *Self-Regulating*

CUSHIONED AIR CYLINDERS

Meet Most Operating Requirements

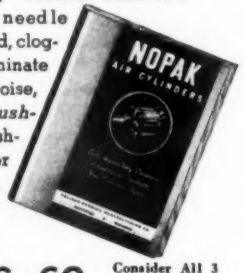
Provide desirable features of Constant Cushioning with Smooth Gradual Action.



1. Built-in, Self-Regulating Air Cushion.

2. Quick-opening Air Duct assures quick starting under full power.

● Since their introduction late in 1939, industry has found more uses for the new NOPAK Air Cylinders with Self-Regulating Air Cushion than for the two earlier types combined. Here are a few reasons why: 1. The smooth, gradual, predetermined cushioning action remains constant. 2. There is no needle valve to be frequently re-adjusted, clog-up, or get out of order. 3. Eliminate damaging metal-to-metal impact, noise, shock and vibration. 4. They place *Cushioned* Air Cylinders in the non-cushioned price range. 5. Prolong cylinder life—cut maintenance costs way down. You, too, may find that this new type cylinder will fulfill most of your needs.



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Consider All 3 Types—they're fully described and illustrated in Bulletin 77. If you haven't a copy, send for it.

NOPAK VALVES and CYLINDERS
DESIGNED for AIR or HYDRAULIC SERVICE

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Niagara latest type shears give you accurate flat cutting and more working strokes per hour because of strong, rigid housings and bed . . . triangular section crosshead with low slope . . . smooth acting, toggle-operated holddown with individual spring-cushioned feet . . . self-measuring, ball bearing parallel back-gage . . . enclosed drive with anti-friction bearing mounted gears and instant acting 14 point sleeve clutch running in oil. Write for Bulletin 72. Niagara Machine & Tool Works, Buffalo, N. Y. Branches in Detroit, Cleveland, New York.

SAME PRECISION RESULTS AT 4 P.M. AS AT 8 A.M.

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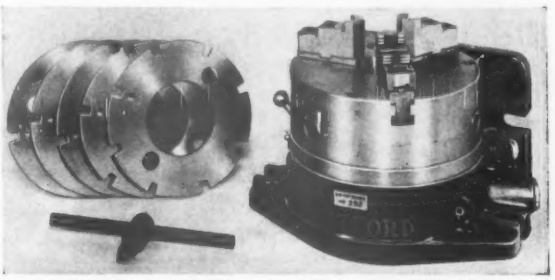

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A.S.T.E. DOINGS

(Continued from preceding page)

interesting talk on "Telescopes and Turret Lathes," which he discussed with the assistance of slides. "Whitey" Poock and his committee have been doing a real job on these meetings and deserve the support of all members.

Syracuse Chapter No. 19

On October 15 the Syracuse Chapter of the A.S.T.E. held its second meeting of the fall. The dinner gathering was attended by twenty-three members including Wally Ross. Mr. Ross demanded solitude with his meal and waited until everyone else left the tables before he decided to eat.

We know now that Wally has great will power to withstand the delicious odors of roast lamb and mint jelly, but we would be most interested to know how long he has been demanding the undivided attention of our waitress. It was only after our most exclusive comrade finished his very excellent repast, that the chapter could continue with its business meeting.

Chairman, Charlie Allen, after consideration of several important questions before the Chapter, introduced Mr. Roy W. Jenkins of the National Metal Trades Association, the speaker of the evening. Mr. Jenkins led the group in open forum discussion on the topic, "How can we as Tool Engineers, Help in the National Emergency Educational Program?" This was the first discussion of this type ever to be attempted by the Syracuse Chapter and proved to be a remarkable success. Great credit is due Mr. Jenkins for his method of procedure and also for the response which he stimulated from many customarily reticent Chapter members. Unquestionably aroused, the entire group of fifty-five present was most enthusiastic for similar forum discussions in the near future.

Schenectady Chapter No. 20

On Monday evening, October 14, about 100 members of Schenectady Chapter heard James Longwell, Chief Engineer of the Carboloy Company outline the possibilities in the field of metal cutting through the use of carbide tipped tools. Mr. Longwell directed his talk primarily toward the application of this type of tool to the cutting of steels and revealed many surprising developments resulting in increased production through the researches conducted by his company.

"In 1935," said Mr. Longwell, "our efforts for the first time were directed toward tooling up an actual production job with carbide tools. When experiments were completed, production had been increased one hundred percent. This job has been in continuous operation with results highly satisfactory."

The two major factors in the successful application of carbide tools to the cutting of steels, Mr. Longwell pointed out. are the method of applying the coolant and use of a cutting speed at which the "built up" edge does not appear. Experiments have resulted in entirely different methods of applying coolants than those almost universally established by the machine tool industry. Adoption of higher cutting speeds caused the "built up" edge to disappear with which carbide cutting tools will not satisfactorily operate. This produces a "free cutting" tool with a consequent increase in quantity and quality of production as well as an appreciable decrease in driving power required. Mr. Longwell also stressed the importance of giving close analysis to the handling methods employed by the operator in placing work in and out of the machine and to the location of levers and handles used by him in manipulating his tools.

Mr. A. H. d'Arcambal, National President of the Society, was among the guests, and in a short talk preceding the address of the evening discussed briefly the activities planned for the semi-annual meeting of the Society in Cincinnati on October 17, 18, and 19. Mr. d'Arcambal also reviewed the National growth of the Society in the last year, commenting on the addition of Chapters to a total of 38 and increase in membership from 3700 to 5500.

(Continued on following page)

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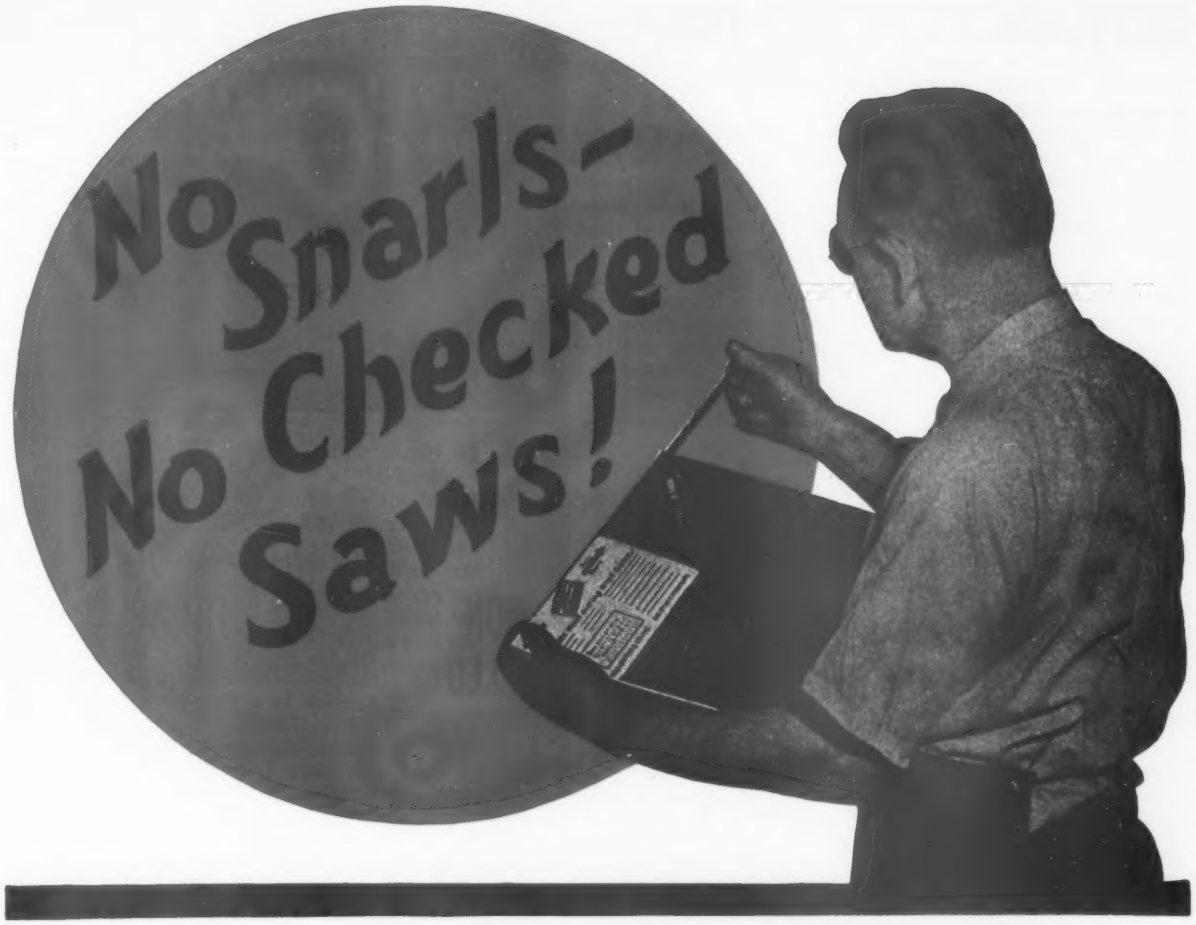

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A.S.T.E. DOINGS

(Continued from preceding page)

In commenting on the high quality of programs maintained by all Chapters, Mr. d'Arcambal pointed out that this can serve as an indication of the value industry places on the services of the Tool Engineer, which is evidenced by the willingness of many manufacturers to donate the time and effort of some of their key men to prepare such valuable talks and present them to our groups.

In the business meeting preceding Mr. Longwell's talk, Chairman Diehl outlined briefly coming events and reports were made by all committee chairmen. The reports indicated that a full and profitable program is ahead for Chapter 20 during 1940-41.

Tri-Cities Chapter No. 23

The Tri-Cities Chapter held its regular monthly dinner meeting October 2, at the LeClaire Hotel, Moline.

The featured speaker of the evening was Mr. Walter K. Bailey, Sales Manager of the Warner & Swasey Co. of Cleveland, Ohio, pioneers in the making of telescopes, who gave an interesting talk on "Telescopes and Turret Lathes." Mr. Bailey illustrated his talk with slides and motion pictures.

Three new members, Messrs. Richard J. Jesse, Herman Hippen, and Nathaniel Goff were welcomed to the Society.

Elmira Chapter No. 24

The Elmira Chapter held its September meeting at the Langwell Hotel at 6:30 p.m. in the Blue Room. Dinner was served. Mr. J. Raymond Blank, Chairman, gave a short talk on the possibility of organizing a speakers' club, as a side line, so that members would receive some outside training and would be better equipped to express themselves at our monthly meetings, especially at open meetings. Several members expressed the desire to join such an undertaking.

Mr. Blank then introduced Mr. Ford Lamb of Detroit, who is Executive Secretary of the A.S.T.E. Mr. Lamb gave a very interesting talk on "Tool Engineering—it's development and future."

Worcester Chapter No. 25

The October meeting of the Worcester Chapter was held at Putnam & Thurston's Monday, October 14, at 8 p.m. The meeting was preceded by a dinner at which the fellows were entertained with music supplied by a three-piece orchestra.

Ray Coleman, Chairman, opened the meeting with an announcement that the November meeting would be held in Athol on the 12th. The Athol boys have promised us a real bang-up meeting. Mr. Cole then introduced Mr. R. K. Martikke who showed a natural color sound film entitled "Iron Men of New England." The film was prepared by the Mystic Iron Works and New England Coke Company, and gave the layman a very good cross section of the metal working industry and is highly educational.

Henry Wilder, one of the boys in our Chapter, showed two short movies. The first, fishing, showed how the big fish were caught. We thought that Henry might have prepared us for the shock of seeing a man pick up a 600 (?) lb. tuna and walk off with it balanced on his head. That was laying it on a mite thick. Henry's second film showed some of the best gridiron clashes of last year and how the trick plays were run off. It looked easy on the screen but it also showed what a lot of teamwork is necessary to make a smooth clicking eleven. Henry is a home movie fan and makes his own movies. We understand that the technique of making up-side-down movies has him baffled. He says that it is quite a strain to stand on his head each time he makes one. Maybe we ought to tell him that it would be easier to just turn the camera upside down.

Ontario Chapter No. 26

The first meeting of the 1940 season was held at the Wentworth Arms Hotel, Hamilton, Ontario, and about twenty members from Toronto travelled to Ham-

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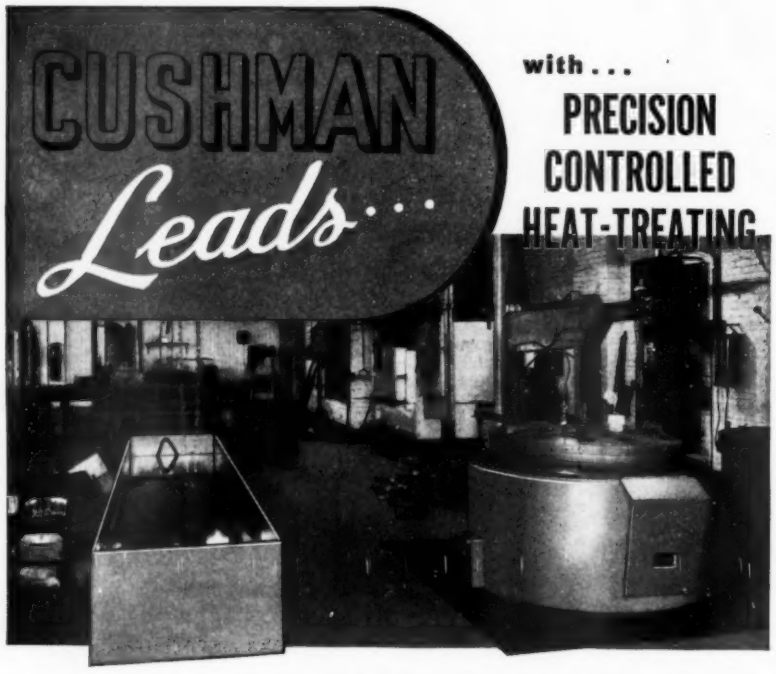

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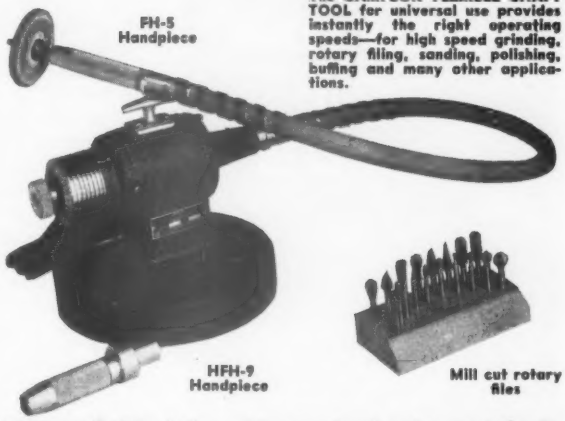

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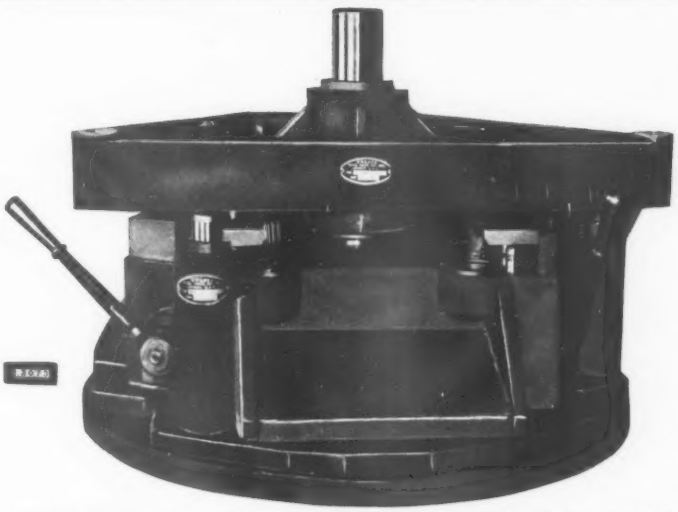

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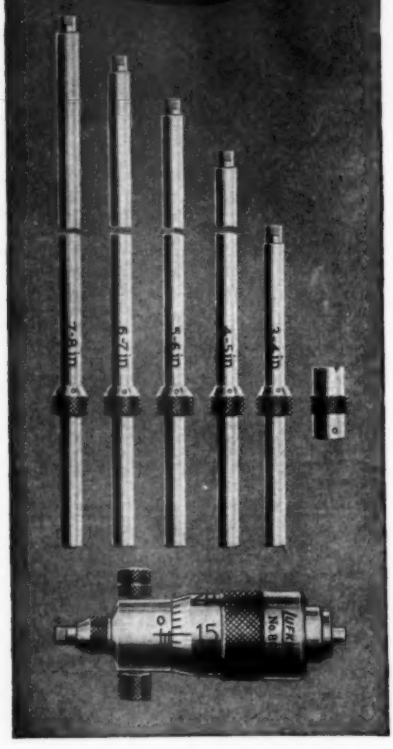

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A.S.T.E. DOINGS

(Continued from preceding page)

ilton for the meeting. Dinner was served with thirty-three members attending.

Following the business of the evening, the Chairman of the Ontario Chapter, who was the guest for the evening, and his place was occupied by Mr. E. Barker, Vice-Chairman—gave a very interesting talk on "Processing Material for War Purposes." The talk was amplified by various samples of Ordnance items displayed by the speaker, and some of the difficulties that had been encountered at the present time were dealt with. Permission had previously been obtained by the speaker, from the Department of Munitions & Supply, for such points as were brought out.

Los Angeles Chapter No. 27

Los Angeles Chapter of the Tool Engineers is experiencing increasing activity due to the rapid growth of the aircraft industry in this territory. At its recent monthly meeting, attended by 125 members and guests, intimation was given that it may be called upon to join with other Chapters in some form of educational program to be projected at the A.S.T.E. semi-annual meeting in Cincinnati. This informal warning was given by C. J. Oxford, Chief Engineer of the National Twist Drill Co., a member of the Detroit Chapter and for the moment, speaker of the evening.

Mr. Oxford's highly interesting illustrated talk on "Metal Cutting Problems and their Solution in the Shop" invited many questions on dural machining problems in the aircraft industry.

Chairman Louis Biehler will represent the Chapter at the Cincinnati meeting.

Golden Gate Chapter No. 28

The special meeting of the Golden Gate Chapter was a combined plant inspection tour, dinner and a technical session.

The plant inspection of the Vulcan Foundry Company was attended by approximately eighty members and guests.

Dinner was held at the California Hotel in Oakland, with approximately sixty members attending.

As a coffee talk, an interesting picture of "Rotary Head Tool and Die Miller" was shown through the courtesy of the Moore Machinery Company of San Francisco. The film was colored and was the latest contribution to the field of tool and die making by Kearney and Trecker Company of Milwaukee.

Mr. James L. Francis was introduced by Mr. Horack and gave an interesting talk on "Practical Hints from the Foundryman to the Designing Engineer." His talk was illustrated by a film showing the making of Patterns, Molds, and Castings of Merco Nordstrom Valves.

A lively discussion followed the talk.

Greater New York No. 34

The greater New York Chapter held its meeting in the main ballroom of Hotel New Yorker on September 9. Dinner was served to ninety members and guests. About 300 attended the meeting. Mr. Orchard introduced Mr. d'Arcambal, the Society's President, and Mr. C. O. Hersam, National Secretary, who spoke on the growth of the Chapter and the progress of the Society.

The speaker of the evening was Mr. Spencer B. Terry of Pratt &Whitney Div. Niles-Bement-Pond Co. Mr. Terry gave an illustrated talk on the subject "Modern Gaging Practice," which proved to be highly interesting and informative. Following this talk a short question and answer period ensued. The draw was then made for the door prize.

Columbus Chapter No. 36

The Columbus Chapter of the Society held its monthly dinner meeting at the Hotel Fort Hayes on September 12, 1940.

A discussion was held for the purpose of receiving suggestions on how the membership committee might develop a program to expand our organization.

Mr. F. O. Hoagland, master mechanic of Pratt & Whitney Division, Niles-Bement-Pond Company delivered an interesting address on "Jig Boring". His talk was illustrated with slides showing the development of precision measuring instruments.

The meeting came to an end with a round table discussion on measuring and gaging methods.

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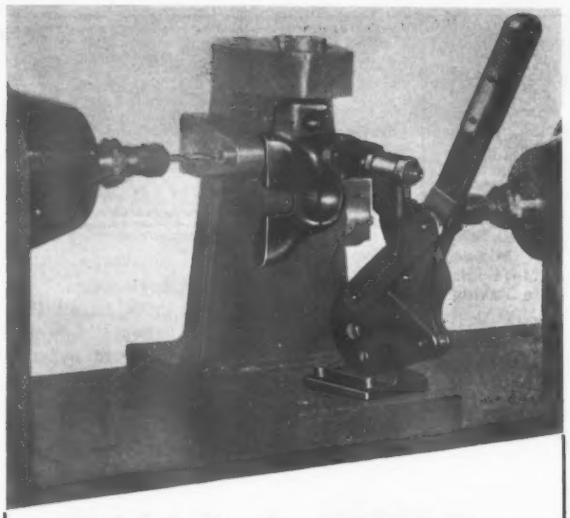

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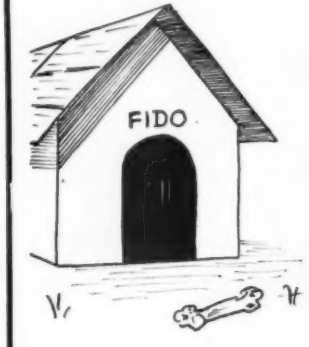

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▼ ▼ ▼

I had a pleasant surprise the other week when, casually scanning the football scores, I saw Upsala College mentioned, incidentally on the wrong side of the scoreboard. It was the first time I had seen my alma mater in the gridiron news in thirty odd years, the faculty having outlawed football the year I played on the eleven. It seems we couldn't take it, and thereby hangs a tale. To begin with, I chose Upsala for several reasons; tuition and living were cheap, and, due to a small student body, one practically enjoyed individual instruction. Then, too, I was all but broke, having but briefly rounded out my lean apprenticeship years as a journeyman machinist, and the locality (the Oranges in New Jersey) afforded opportunity for spare time work. I had to "earn while learning". Finally, there was the rather serious consideration that, having quit school in the sixth grade to start work, my scholastic record was all but nil although the evening and correspondence schools hadn't done so badly by me. But Upsala waived diplomas (at the time) provided the prospective student could pass entrance exams. So, hopefully, I packed by best suit, balbriggans, shirts, socks, ascot tie (I wore my only pair of shoes) and boarding a Joy liner, set off for an education. When I had matriculated, bought second hand books, paid a dollar for a room and set aside a week's eats, I had a thin dime left.

(Continued on following page)

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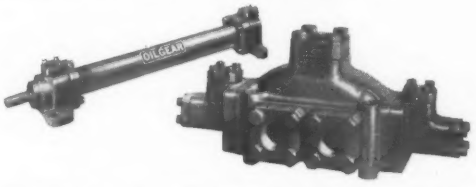

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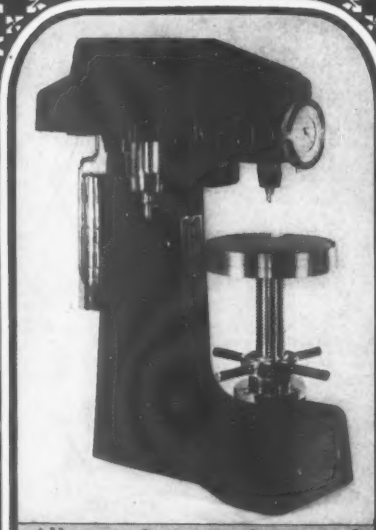

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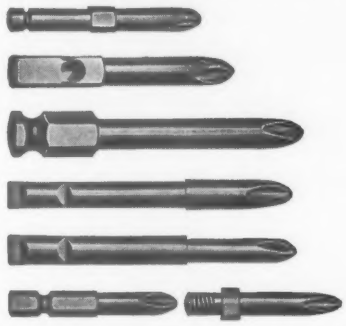

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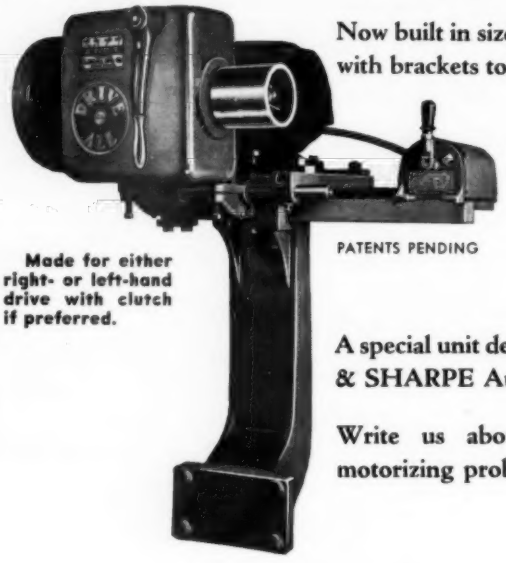
Stud Setters . . . Universal Joints . . . Tension Wrenches . . . Plain Socket Wrenches . . . Parallel Floating Tool Holders . . . Universal Floating Tool Holders . . . Universal Joint Socket Wrenches . . . Positive Drive Chucks and Collets . . . Quick Change Drill Chucks and Collets . . . Friction Drilling and Tapping Chucks and Collets . . . Friction and Positive Vertical Float Tapping Chucks and Collets . . . Aircraft Universal Joints.

The
APEX MACHINE & TOOL
Company
503 E. Third St. Dayton, Ohio

Motorize with DRIVE-ALL Units



Made for either right- or left-hand drive with clutch if preferred.

Now built in sizes from 1- to 10-HP, with brackets to fit all machines.

PATENTS PENDING

A special unit designed for BROWN & SHARPE Automatics.

Write us about your individual motorizing problems.

Manufactured by

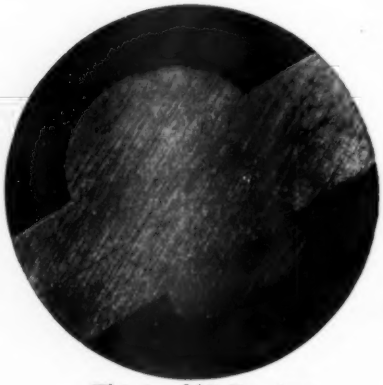
DRIVE-ALL MANUFACTURING CO.

3400 CONNER AVE. DETROIT, MICH.

1500 (average) rigid joints per hour

3200 (maximum)

Handled on the RIVITOR, your riveting job's approach to this maximum is governed by the ease with which the work can be handled.



This is a ¼" dia. rivet joint section showing the preferred type of joint accomplished on the RIVITOR

Exactly how a preferred type of solid rivet joint is accomplished at these rates is shown in our new RIVITOR Bulletin R-4 in addition to complete specifications of standard type RIVITORS. Typical toolings are illustrated and described some of which serve as an assembly unit (besides holding the work for the actual riveting operation) to still further increase production. *Your copy of the Bulletin will be sent promptly. Address - -*

THE TOMKINS-JOHNSON CO.

624 North Mechanic Street Jackson, Michigan

HANDY ANDY SAYS

(Continued from preceding page)

Upsala is a Lutheran college, and being somewhat of an heretic and versed in the expressive vocabulary of the shop (somewhat toned since then) I'm fain to admit that my tenure hung by a slender thread at times. But, liking people personally, and on the whole well liked in turn, I got along. No doubt a flair for language, writing and drawing helped; I came in handy at times. For keep, shingled roofs, tinkered with automobiles, did odd jobs, kept busy and had an occasional dime for doughnuts and cider. A football team was organized, and of course I joined the team. Of the thirteen men on the squad (all we could muster out of a student body of sixty odd including co-eds) one was a cripple who had lost a hand in a sawmill while several of us had never seen a football game, let alone played. And, on the whole we were poor as church mice; like myself, the lad who played end at my left owned one pair of shoes, only his laced to the knees. When dressed up, he'd wear them inside his pants legs; for football, wore them outside. With that outfit we had the colossal gall to slate a game with Seton Hall, a neighboring Catholic college whose football squad alone outnumbered Upsala's entire student body.

▼ ▼ ▼

Of the game, the less said the better. We started off with just one sub, a 90 lb. ex-clerk, our star back (an excellent, all-around athlete) having been laid up with a torn ligament. Seton Hall just swarmed all over us, and my dress (?) shoes, uncleated, might as well have been a pair of skis. I slid on them until, in desperation, I took them off and handed them to a priest, grinning on the sidelines. "Please father, hold 'em for me." Early in the game, we began to suffer casualties; broken noses, split lips, black eyes, bruises. They stepped on my toes and stove in two ribs, and for the rest of the game (and for weeks afterwards) every breath was sheer agony. When we came back Prexy regarded us sadly, shook his head and decided he'd rather run a college than a hospital. Well, Upsala has grown through the years and is now giving its rivals a run for their money. But oh, to be eighteen again!

▼ ▼ ▼

Well, as I said in the opening paragraph, one thought leads to another. A noon-hour foursome—the G. M., the production manager, a department superintendent and myself — were comparing notes over the coffee the other day, and the talk turned to the comparative advantages of modern youth over its elders.

(Continued on following page)

KENNAMETAL

Sets New Records for Carbide Tools TURNING AUTOMOBILE AXLE SHAFTS

Style No. 11 Tool with Chip Breaker

Recent advances in metallurgy have resulted in the discovery of KENNAMETAL, a superior carbide tool material that makes possible even greater production economies than those established by previous carbides. The following records are typical:

Operation: Rough turning bottom of flange end wheel shafts (heat treated to 350 Brinell).

Comparative Performance: KENNAMETAL grade KH, 81 pieces per grind; best previous carbide tools, 60 pieces per grind.

Operation: Rough turn top side of flange end of axle shafts (heat treated to 350 Brinell).

Comparative Performance: KENNAMETAL grade KH, 123 pieces per grind; best previous carbide tools, 60 pieces per grind.

The above results represent average runs on thousands of pieces and therefore prove conclusively the superior wear resistance of KENNAMETAL. In addition, KENNAMETAL is far stronger and more "crater-resistant" than any other carbides. Despite its marked superiority, KENNAMETAL tools cost no more than ordinary carbide tools. Write for our new Price List No. 5 showing price reductions as high as 60% on standard tools.

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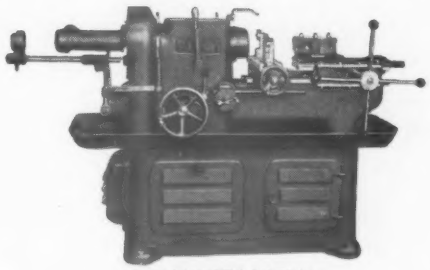
600 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

INFINITE SPINDLE SPEEDS

ranges: 90 to 180 R.P.M.
180 to 3600 R.P.M.



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Motor Drive

A turn of a handwheel gives the exact spindle speed, indicated by a direct-reading dial.

Spindle speeds are obtained by increasing and decreasing center distance between motor and spindle, thus obtaining an infinite number of spindle speeds ratio of 1:2. Back gear ratio—1:4.

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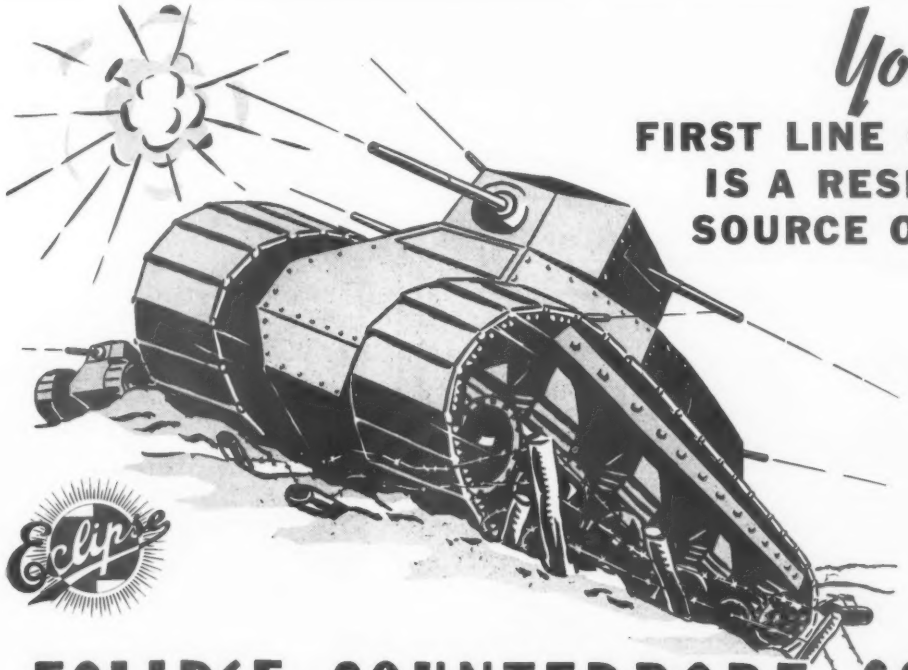

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FIRST LINE OF DEFENSE IS A RESPONSIBLE SOURCE OF SUPPLY

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ECLIPSE COUNTERBORE COMPANY

DETROIT · MICHIGAN

HANDY ANDY SAYS

(Continued from preceding page)

Sure, our children enjoy luxuries and advantages that were beyond the wildest dreams of a lot of their parents, but, will they do as well? Or, to put it another way, can they, under the present paternalistic system? No, I am not disparaging modern youth; on the contrary, I am for it, have faith in it. The question is, will the modern youngster who has the use of a car and gets ample spending money set the same value on things that his father did? Can he achieve a comparative success in an age of regimentation, of government paternalism? These questions vex me, as they vex many of my contemporaries.

▼ ▼ ▼

In mental review, the boys with whom I grew up pass before me, the most of them children of poor parents and the most of them at work in the mills and factories when barely in their teens. Yet, the most of them have done pretty well; they have become foremen and superintendents, engineers and plant managers, executives and business men. I hear, occasionally, of my fellow students at Upsala, boys from the Pennsylvania mines, from eastern mill towns and western lumber districts, and they have become ministers, educators, bankers, professional men; if not famous (although a few have scaled the heights as a minority will) they have at least become comparatively successful. They were success minded, worked toward a goal and knew no barriers except their own limitations.

▼ ▼ ▼

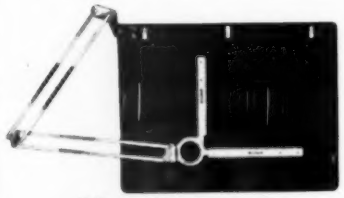
The point I want to bring out is that, in our generation, there were no tangible barriers; the Horatio Alger success wasn't altogether fiction. There were giants created in those days, as the biography of many a contemporary industrial leader will attest. Or, run through the membership of the A.S.T.E., mainly composed of men in the above-average class. But, they didn't have seniority as a barrier to success, rather, having ambition to start with, and scope for initiative, they took life in its stride and shot for goals which, to poor boys, were but glimmers on the horizon. Apprenticed,—or "stealing" his trade, as many a boy did—there was always a model ahead; the foreman, the superintendent, the draftsman at his board, and the Old Man in the front office. And if advancement was too slow, there was opportunity afield. The tool and diemaker, for example, wasn't chained to one employer for life with the onerous bonds of seniority, and inversely, the employer could choose his men on their merit. The system was a model for progress. And there was progress; no age, since the dawn of history, has seen the like of the achievement and progress which have been typical of this age of invention.

▼ ▼ ▼

Well, there's the thought for today, and I hope I am not seeing the future through smoked glasses. That would be rather contrary to my philosophy and preachment of progress. But, I read the terms of the Wage-Hour Act, as recently interpreted, and somehow I wonder if the Great White Father, through his bureaucrats, isn't trying to legislate out the very spirit of initiative and individual progress that projected so many of our contemporary industrial leaders to the status of giants. For all of their travail, for all of their long hours and sacrifices in their pork and bean days, I'll bet that the most of them would bring back the age of competition if they could. And that's not reaction, because the American System as it was spelled progress, and we have no guarantee that the neopaternalism will effect progress. Rather, the trend is to rear class barriers, and barriers are not conducive to progress. Let us have change, and progress—we stand for those things—but, for gosh sake, don't regiment out the American System of free enterprise. It worked, and it afforded opportunity. And that is what America has stood for.

Yours for Progress,
Andrew E. Rylander.
(Otherwise Handy Andy)

DRAFTO



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Drawing machines in a price range from $4.50 to $19.75

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GENERAL SPECIFICATIONS

The board is made of tempered Masonite Prestwood. Arms are chrome plated and polished on the top side. All other parts are dull chrome finish. Protractor may be purchased either with or without latch.

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Floating Holder

"It Always Floats"

FLOATS RADIALLY

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

Compensates for spindle misalignment, eliminating oversized or bell-mouthed holes.

Holders sent subject to your approval before acceptance.

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The quick way to specify and obtain uniform, economical hydraulic installations.

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INSIDE STORY

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It's what you ***don't see*** in a hollow set screw that shows up in service. Here are a few of the "hidden qualities" packed into every Mac-it.

Produced from electric furnace steel, Mac-its are milled from solid bars to insure accuracy. Each angle of the sockets is accurately ***cut*** to insure positive key engagement.

Every Mac-it shown here is standard. For details call your Mac-it distributor or write us direct.

LOCK IT!
Hollow lock screws are available for use with hollow set screws. Positive action is insured.

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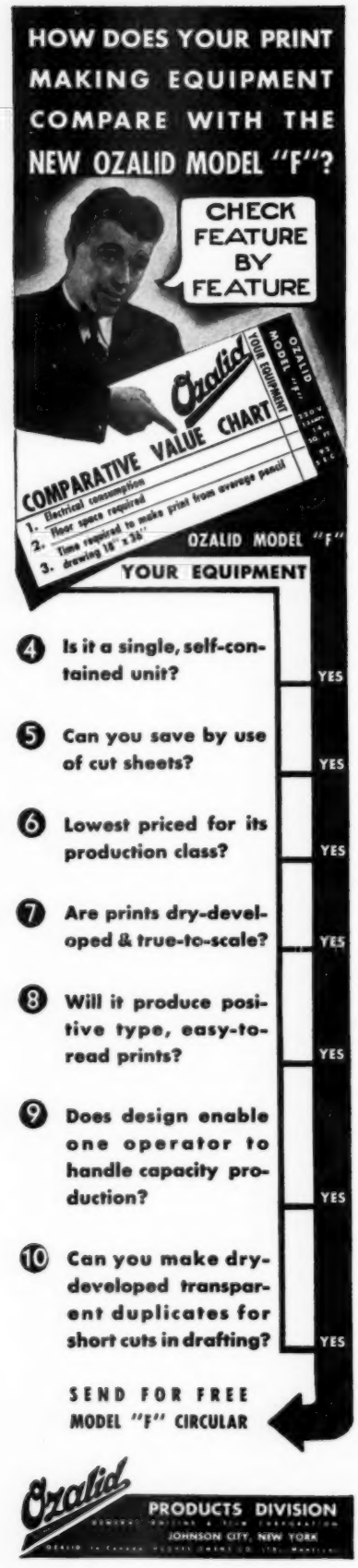
THE STRONG CARLISLE & HAMMOND CO., Cleveland, Ohio


HOW DOES YOUR PRINT MAKING EQUIPMENT COMPARE WITH THE NEW OZALID MODEL "F"?
CHECK FEATURE BY FEATURE
Ozalid
COMPARATIVE VALUE CHART
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1. Electrical consumption
2. Floor space required
3. Time required to make print from average pencil drawing 18" x 24"
OZALID MODEL "F"
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4 Is it a single, self-contained unit? YES
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SEND FOR FREE MODEL "F" CIRCULAR
Ozalid
PRODUCTS DIVISION
JOHNSON CITY, NEW YORK

THE Passing Parade

J. W. Doody and Ray D. Mack head the newly opened office of the Carboloy Company, Inc. in Los Angeles. Mr. Doody has represented the company on the coast for a number of years. Mr. Mack has been a field and service engineer in Wisconsin. Frank Staroba, former representative in Missouri, succeeds Mr. Mack in Wisconsin, while E. Monacelli, of the Chicago territory, takes charge in Missouri.

J. J. Barton, one time sales manager of the Earle M. Jorgenson Company, has been appointed to the Tool Steel Division in Southern California of the Allegheny Ludlum Steel Corporation.

Donald S. McKenzie has been appointed sales manager of the plastics department of the General Electric Company, Pittsfield, Mass. He succeeds W. H. Milton, Jr., who recently was named assistant manager of the department. Mr. McKenzie comes to his new position from Cleveland where he has been affiliated with the General Electric Company at Nela Park in the sales fluorescent sign tubing and fused quartz department since October 1938.

John I. Graham has joined the management staff of the Worcester Moulded Plastics Company, Worcester. He was formerly with the Foster-Grant Company in Leominster, where he was a specialist in production problems.

Shell F. Meyers, who has been sales development manager of the East Springfield, Mass., plant of the Westinghouse Electric and Manufacturing Company has been advanced to sales development manager for the Atlantic district of the company and has left for Philadelphia. He was given a farewell party by officials of the East Springfield plant, former associates and members of his department at Hotel Sheraton before his departure, and during the evening was presented a wrist watch. L. G. Huggins, superintendent of air conditioning department served as general chairman of the banquet committee. Among those who spoke were William O. Lippman, works manager; J. M. Hipple, assistant manager of merchandising and engineering, who was toastmaster; P. L. Danley, sales manager of the air conditioning department; J. H. Asbaugh manager of merchandising and engineering; H. D. Griffith branch manager; Edward Hall, manager of Westinghouse supply sales division and E. R. Woolfert, superintendent of the air conditioning department.

James Y. Scott, president and general manager of Van Norman Machine Tool Company, Springfield, Mass., has been

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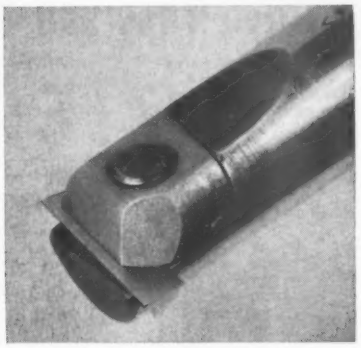

The new EVEREDE BORING BAR is the only bar on the market having the economical triangular bit. The design of this boring bar permits the use of a larger diameter than formerly used, due to having the bit cut in front, making room for the bar. This design spells rigidity, making higher boring speeds and heavier cuts possible.

The EVEREDE BORING BARS are made of the finest heat treated nickel steel; and each bar comes equipped with six high speed steel triangular bits. In addition, this is the only boring bar that allows the use of a solid Stellite or carbide tool bit. This is accomplished by clamping the bit on the "V" type grip, which holds it firmly without danger of breakage. Send for descriptive folder.

EVEREDE TOOL CO.
Willis Stutson
184 N. WACKER DRIVE, CHICAGO
Representatives in principal cities

IMMEDIATE DELIVERY
on
USED MACHINE TOOLS and POWER PRESSES
for:
1. Production
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These are on hand in our Warehouse for Your Inspection.

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PNEUMATIC GRINDERS GIVE *More Power*

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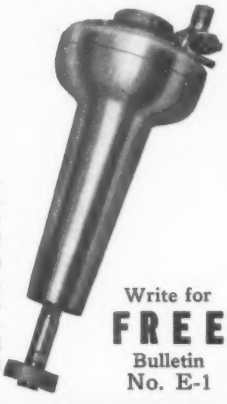
E-1 AIR GRINDER
35,000 R.P.M.
½ Horse Power



For Large Dies and Drop Forgings

Why be satisfied with slow, inefficient tools? The Onsrud E-1 Grinder cuts time of many heavy duty DIE grinding jobs as much as 50%! Powerful, vibrationless — maintains full speed even under heavy load. Has impulse reaction type rotor. Full automatic lubrication. Practically impossible to stall, and will not heat up by over loading. Send for free bulletin No. E-1.

Write for **FREE** Bulletin No. E-1

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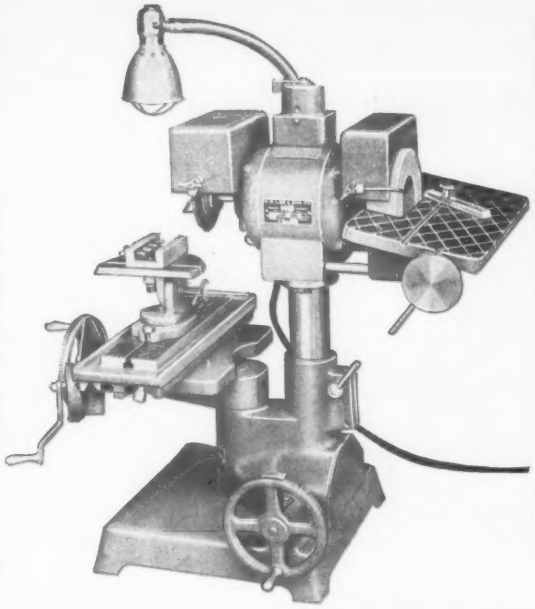

This ***NEW CARBIDE TOOL GRINDER*** performs all of the necessary operations for the upkeep of high speed carbide-tipped tools.

Bulletin CTG40-TE11 tells all about it.

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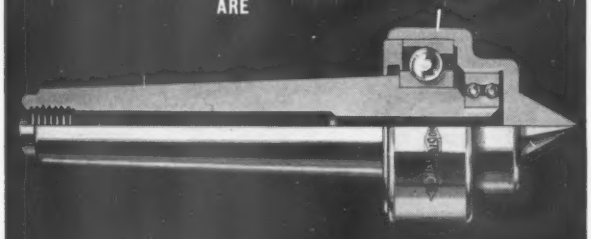

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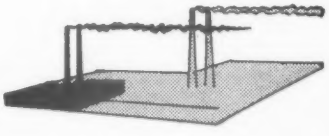

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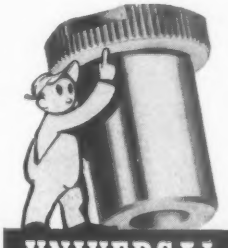
American Industry is more and more specifying Universal drill bushings because: (1) they have superfinished bores, straight and round within .0001; (2) unexcelled wearing qualities; (3) rust-proof black domes; and (4) nickle-steel, cadmium plated lock screws. Available in all ASA standard sizes. Write for facts.



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BENCH PUNCH

Built for hard, tough work—die cannot lose alignment with punch—all parts interchangeable.

Capacity ½" holes through 1/8" steel; 11/32" through ¼" steel. Can also be made for holes up to 7/8" in thinner metal. Stock punches and dies available from 1/8" to ½" by 64ths.

Weight, 70 lbs.

PRICE WITH ONE PUNCH AND ONE DIE—

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Immediate Shipment

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We HAD The Design

for Non-Scratching FEED FINGERS

. . . but it required the development of a special bronze alloy to produce a *practical* feed finger which would eliminate scratching on highly finished surfaces.

By the use of the new bronze, which possesses exceptional spring qualities, it became possible to manufacture "non-scratch" feed fingers of *exactly the same design*—and incorporating the many exclusive patented features—as the standard steel Modern Pushers.

Modern Bronze Pushers provide excellent anti-friction (non-scratching) characteristics . . . long-wearing qualities . . . and spring tension which enables them to maintain their grip over long periods of service.

MODERN COLLET and MACHINE CO.
407 Salliotte St. • Ecorse, Mich.

PASSING PARADE

(Continued from preceding page)

elected president of the National Equipment Company, Springfield. Officers of the Van Norman Company were elected to important positions in the National Equipment Company. George A. Bausman, who was president of National Equipment Company is now vice president; A. Linton Bausman, who was vice president and secretary, remains as vice president; Henry A. Field is also a vice president. George A. Bausman remains as treasurer and the assistant treasurer is Reginald W. Porter, assistant treasurer of Van Norman. Frederick D. Van Norman was elected clerk.

With the tremendous task of equipping the Army, this country is faced with the same problem of production as confronted it in 1917, Col. Douglas B. Wesson, in charge of the administrative division of the Hartford Ordnance Department, declared at the meeting of the Purchasing Agents Association of Western Massachusetts at Hotel Sheraton recently. Overnight production results cannot be expected and it will take several years to reach the peak, Col. Wesson warned.

Frank Mossburg, Attleboro, Mass., inventor, celebrated his 83rd birthday with more than 1,200 fellow citizens of Attleboro, at the World's Fair in New York, recently. During the festivities, Mossburg received a gold medal, presented in the Fair's Hall of Inventions by Mayor John W. McIntyre on behalf of Attleboro's citizens. He was awarded the Order of Vasa, highest honor presented to noncitizens by the Swedish government, in the Swedish pavilion, and received a plaque of merit presented by the Fair. Mossburg invented a roller bearing, the micrometer and built an automobile four years before Henry Ford's first one but never put his car on the market. He founded the Mossburg Steel Company of Attleboro; the Standard Machine Company of Providence, R. I. and in 1898 the Mossburg Roller Bearing Co. Ltd. in London.

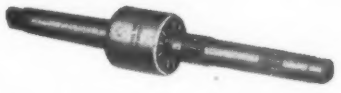
Died

Stewart E. Dawson, industrial engineer for International Harvester Company in East Moline, member of the A.S.T.E., after an operation.

John F. Coneen, development engineer of the Aluminum Company of America, authority on the machining of aluminum rod, frequent lecturer before A.S.T.E. Chapters, after an illness of several months duration. Among his last writings was an article which appeared in THE TOOL ENGINEER for August.

Items for this department should be sent to Passing Parade Editor, The Tool Engineer.

THE ULTRA-SURFACE
PRODUCED BY THE COGSDILL
BEARING-IZING PROCESS
IMPROVES THE PRODUCT
REDUCES THE COST
ELIMINATES ASSEMBLY DELAYS
AND SERVICE TROUBLES



TWO OR MORE DIAMETERS—COMBINATIONS WITH FLAT OR ANGULAR SHOULDERS—INTERNAL AND EXTERNAL TAPERS, RADII, AND CONTOURS

SEND DRAWINGS FOR ENGINEERING COUNSEL WITHOUT OBLIGATION

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SIDE MILLING CUTTERS

They can be recut to original design—brought to specified standard or special widths or diameters—converted to staggered tooth—converted from straight to spiral tooth—ground with angular teeth or radius corners—arbor holes increased or bushed—keyways changed or relocated—adapted to gang use. The available stock remaining in your worn cutter is the determining factor.

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SMB SPECIAL MACHINE BOLTS

Designed for use in the toolroom and machine shop and made tough and strong to stand up under the rough and exacting usage of the modern busy shop.

Using cheap, poorly made bolts on machine tools is likely to cause a disastrous camber in the machine beds due to the continuous upsetting action of the uneven heads gouging into the surface of the T-slots.

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Have You a Question?

. . . to ask about any items of new equipment described in this issue? Would you like to know more about them? Are any of the pieces of new literature listed on pages 62 and 64 down your alley?

If the answer to any of these questions is yes then there is a simple and easy way to secure the information you seek. Fill out a coupon on one of the post cards folded into this issue for each piece of information you want. Then fill in the identifying number prominently displayed with each item in New Literature and It's New which applies to the item you are inquiring about. Mail us the card and we'll do the rest.

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LIMITED PRODUCTION PROBLEMS

(Concluded from page 191

rious units better workmanship is obtained and far more accomplished by the workmen because of greater freedom being allowed around the job than if the entire body were assembled and welded in one buck. The units are then transferred to the main full assembly buck where the various units, including the roof panel, are welded together as a complete body.

It was learned from experience that this unit construction produces not only a better product but far less time is consumed in production. While sheet metal parts at times appear simple to handle and to fit up because of their flexibility they actually cause more real "headaches" than machining hard metal parts that require extreme accuracy. It is the very flexibility of the sheet metal parts and easy distortion which disturbs the final fitting of the many parts that constitute the finished assembled unit.

In starting to construct and set up equipment for body assembling the most important fundamental was to produce a skeletonized wooden body representation which is used to set all the gages and clamps on the various body bucks. This model is always on hand to check up and adjust the equipment from time to time as wearing parts require. It is used as a medium to settle questions that always arise in body building. Very often certain conditions arise when parts appear to fit very unevenly and unmatched with the mating members. In such cases foremen on these lines often depart or "cheat" from the model setting by adding or removing stock from the gages on the buck. This practice nine times out of ten proves disastrous some time later when a part is troublesome to assemble correctly with a closely related part. The safest system is to always adhere strictly to the model in every detail.

Economy is greatly accomplished on equipment in one instance when two different body type models are assembled in one particular buck. This is made possible by the advantage of swinging in and out of the different gages and clamps. All-steel construction with tubular stanchions lends itself readily to swinging gages, and clamps easily.

The Lincoln Plant, as others in body construction, have their necessary quota of portable and stationary welding machines, which is nothing new or outstanding in body construction. The main requirement is to have enough welders and to locate them conveniently within reach of the operator. In many cases the welders are hung on conveyors to allow them to swing clear when removing the assembled units from the bucks.

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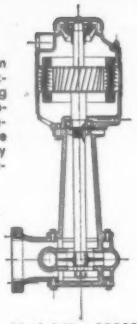

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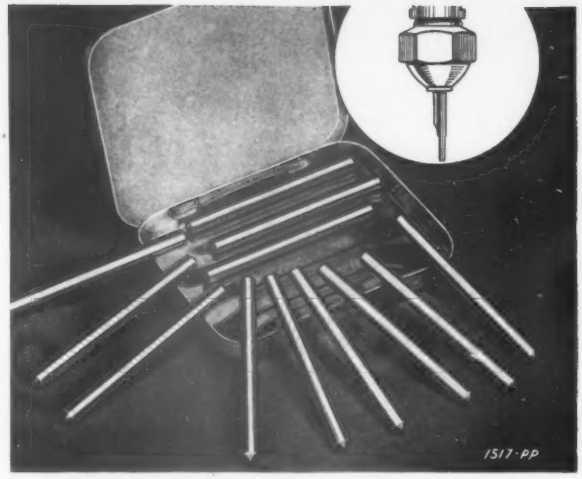

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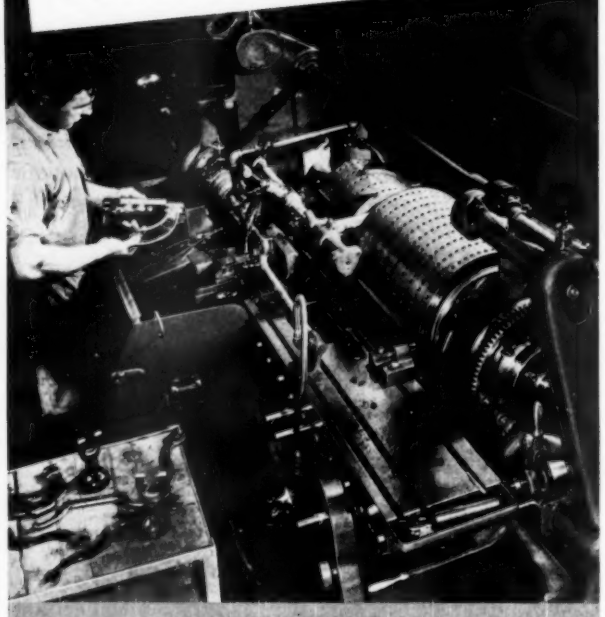
GAUGING THE LENGTH OF A TAP BLANK AS IT COMES FROM MODEL 'B'



• Here in the plant of Greenfield Tap & Die Corporation are 35 Model B Cleveland Automatics, like this one shown producing tap blanks. Sturdily constructed, soundly engineered for steady out-put, Model B is most suited to the job requiring few and simple operations. It is easily tooled up, and has the famous simplicity and accessibility of all Cleveland Automatics. Model B machines are built in a range of sizes from 9/16" to 2½" capacity. For economical production it meets requirements of many plants. • Cleveland Model A *Single Spindle* Automatics are built from 5/16" to 8" capacities and the new stream-lined Cleveland Model AA *Single Spindle* Automatics in 1 1/16" and 1 3/8" sizes.

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CLEVELAND *Single Spindle* AUTOMATICS

November Chapter Meetings

BALTIMORE—Nov. 6. Dinner 7:00, Technical Session 8:00. Sears Auditorium, North and Harford Ave. W. W. Edens, Chief Metallurgist, Ampco Metals, Inc., will speak on Modern Aluminum Bronzes. Reservations: Stanley S. Johns, Tuxedo 2127.

BINGHAMTON—Nov. 14. 7:30 P. M., Art Gallery, Arlington Hotel, Binghamton. A representative of Heald Machine Company, Worcester, Mass., will speak on Boring Operations Requiring Precision Finishes.

BOSTON—Date not given. Dinner 6:30, Smith House, Memorial Drive, Cambridge, Technical Session, 8:00, Room 6-120, M.I.T. Mr. C. I. Kraus, Sales Manager of the Industrial Division of Alemite Corporation will speak on the technical and practical side of lubrication.

CLEVELAND—Nov. 8. Dinner 6:30. Allerton Hotel, Chester & 13th. Mr. J. C. Grindley, Watson Stellman Company will speak on "Under the Ground and Under the Sea with Hydraulics." Illustrated lecture. Reservation: Wm. Rief, Jr.

DAYTON—Nov. 11. Dinner 6:30, Technical Session 8:00. Gibbons Hotel. Mr. G. H. Sanborn will speak on "New Developments in Involute Gearing".

GOLDEN GATE—Nov. 12. Dinner 7:15. Coit Hotel, Oakland. Mr. Harold B. Thayer will speak on the "Design and Making of an All Metal Airplane." The meeting will be preceded by an inspection trip of the United Air Lines and Boeing School of Aeronautics at 5:30 P. M. at Oakland, Calif.

HARTFORD—Nov. 4. Technical Session 8:00 P. M. Hartford Gas Co. Auditorium. Mr. C. A. Hooper, Tool Supervisor of the Chevrolet Motor Company, will speak on "For Longer Tool Life."

INDIANAPOLIS—Nov. 28. Dinner 6:30. Warren Hotel. Mr. G. E. Brumbach of the Carpenter Steel Company will speak on Tool Steel Applications. Reservation: R. D. Harris, 1709 Winton, Belmont 0519J.

LOS ANGELES—Because meetings on the fourth Thursday of the month come too close to holidays, all future meetings will be held on the second Thursday of each month.

MILWAUKEE—Nov. 14. Dinner 6:30, Meeting 7:30. Republican Hotel, Colonial Room. Mr. Francis J. Trecker will discuss "A New Technique in the Art of Tool and Die Milling." Reservation: Julius Reidl, Seaman Body Corp.

NEW YORK-NEW JERSEY—Nov. 12. Technical Session 8:00. Robert Treat Hotel. Mr. J. W. Wells will speak on the Tool and Gauge Problems of Electric Controllable Pitch Propellors.

PHILADELPHIA—Nov. 21. Dinner 6:30. Engineers Club, 1317 Spruce Street. Mr. Ralph H. McClarren will speak on "Aeronautical Activities at Franklin Institute", and Mr. Carl Bentz, Chief Engineer of the Magnaflux Corporation, will discuss "Magnaflux testing of Non-destructive Ferrous Metals."

PITTSBURGH—Nov. 1. Dinner 6:30. $1.00. Stouffer Restaurant, Wood and Diamond Streets. Technical Session 8:30. Mr. J. R. Longwell, Carboloy Company will speak on Recent Developments in Cemented Carbides.

ROCHESTER—Nov. 13. Dinner 6:30, Technical Session 7:45. River Campus, University of Rochester. Mr. Erik Oberg will speak on "The Machine Before the Court of Public Opinion." Reservations: C. G. Newton, 89 East Ave. Stone 2893.

ROCKFORD—Nov. 7. Dinner 6:30. 11th floor, Hotel Faust. Mr. George E. Sanborn of Fellows Gear Shaper Company will speak. Reservations: Allis-Chalmers, Main 6270.

SCHENECTADY—Nov. 11. Dinner 6:30, Technical Session 8:00. Danish Hall, Albany Street. Speaker will be Erik Oberg. Also a movie by Du Pont: "The Story of Neoprene—the Chemical Rubber." Reservation: Don Saurenman, General Electric.

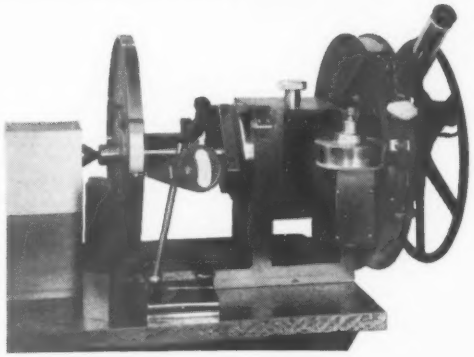
ST. LOUIS—Nov. 14. Dinner 6:30. Melbourne Hotel, Grand & Lindell Blvds. Mr. F. D. Bowman of the Carborundum Company, will give a talk involving grinding applications and methods as applied to industry entitled "Romance of Industry."

SYRACUSE—Nov. 12. Dinner 6:30, Technical Session 8:00. Syracuse Industrial Club, 226 W. Genesee Street. Mr. Erik Oberg will speak on "The Machine Before the Court of Public Opinion." Reservation: 306 Crawford Ave.

TOLEDO—Nov. 12. Dinner 6:30. Toledo Yacht Club. Mr. C. B. Schafer, Engineer at Libbey-Owens-Ford Co., will discuss "Flat Glass." Reservation: R. H. Mogle, 3722 Leybourne Ave. La. 8783.

TRI-CITIES—Nov. 6. Dinner 6:30. LeClaire Hotel, Moline, Illinois. Mr. F. D. Bowman, Adv. Mgr. of the Carborundum Company, will speak on "Manufacture of Abrasives and Abrasive Products."

ANNOUNCING—VINCO OPTICAL INSPECTION MASTER DIVIDING HEAD



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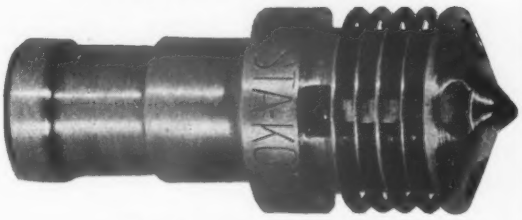

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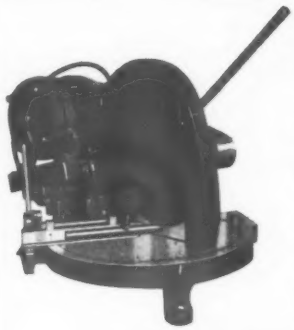

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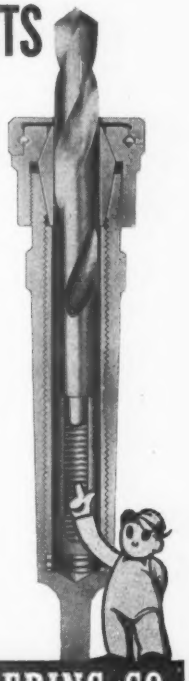

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21/64	5.23	4⅝
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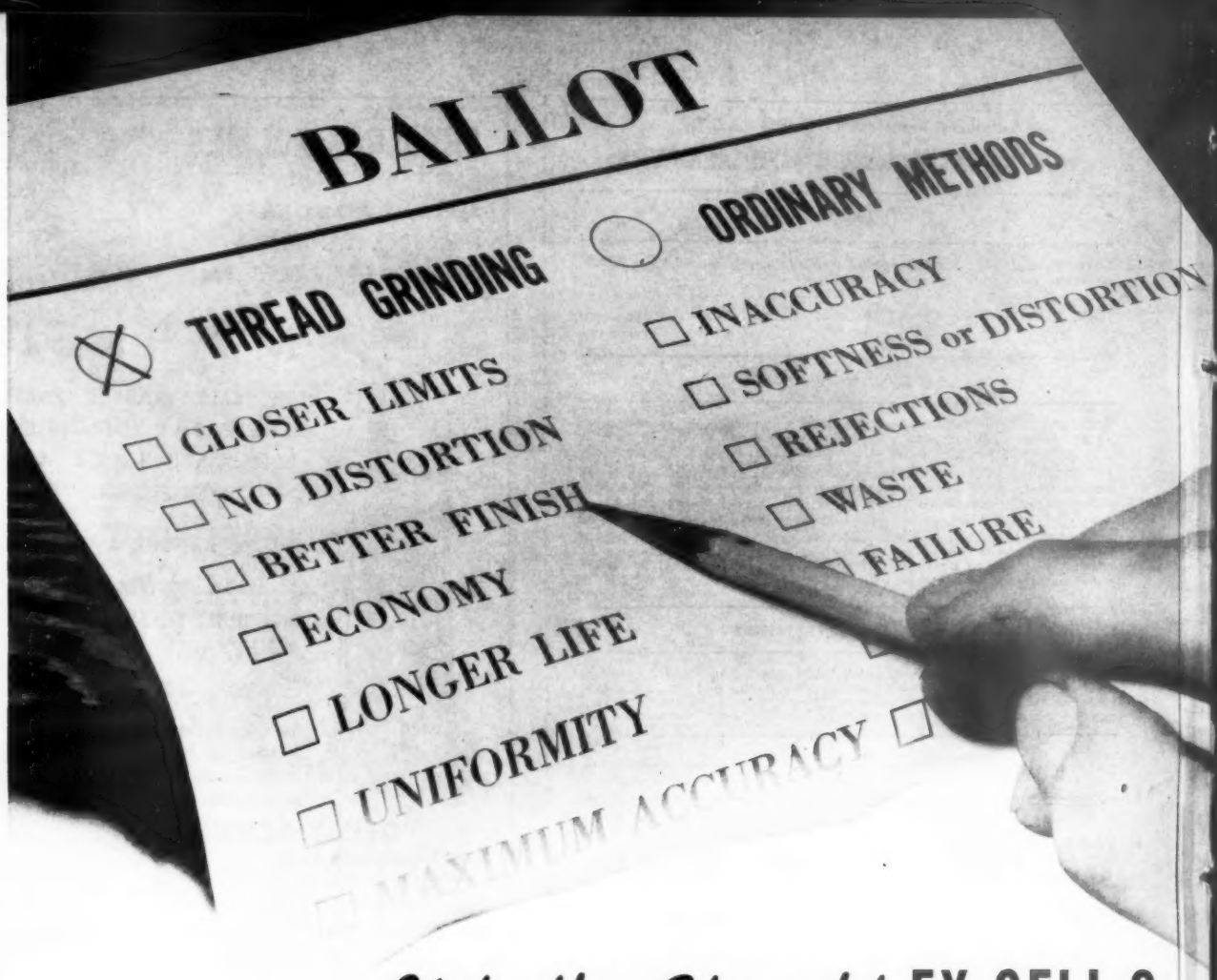

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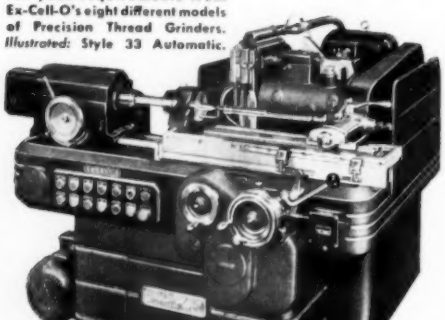

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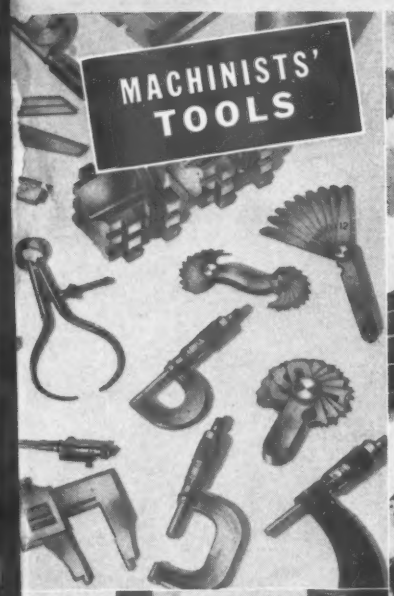

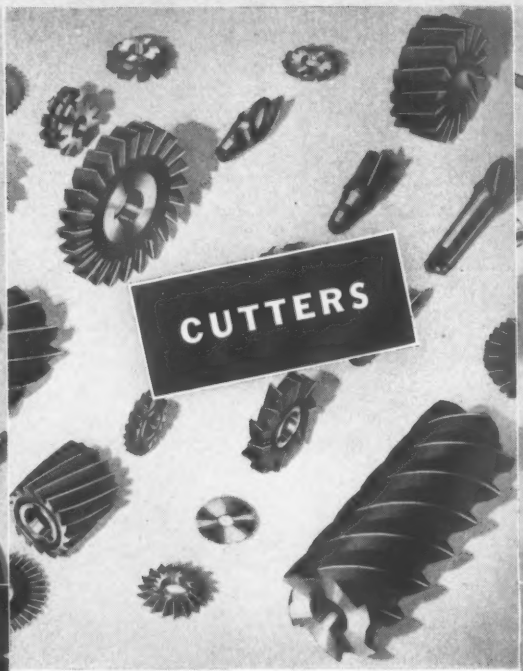

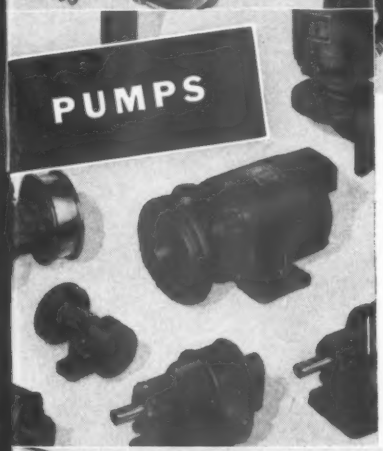

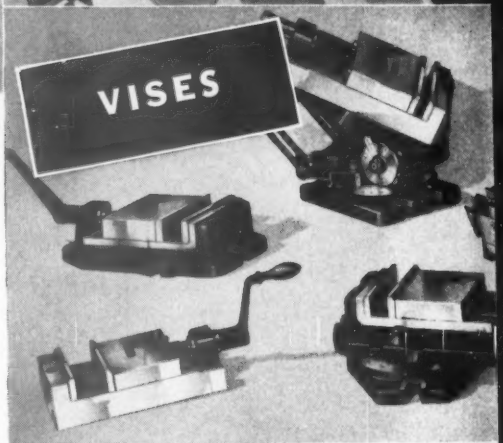

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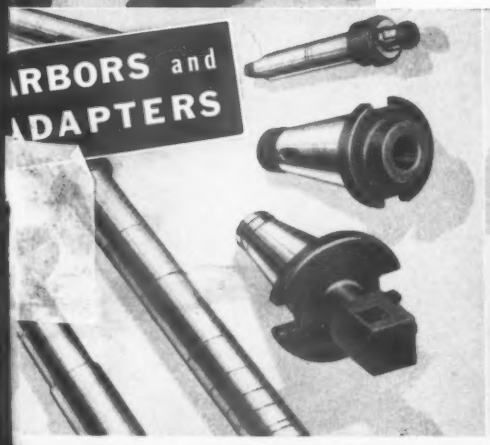

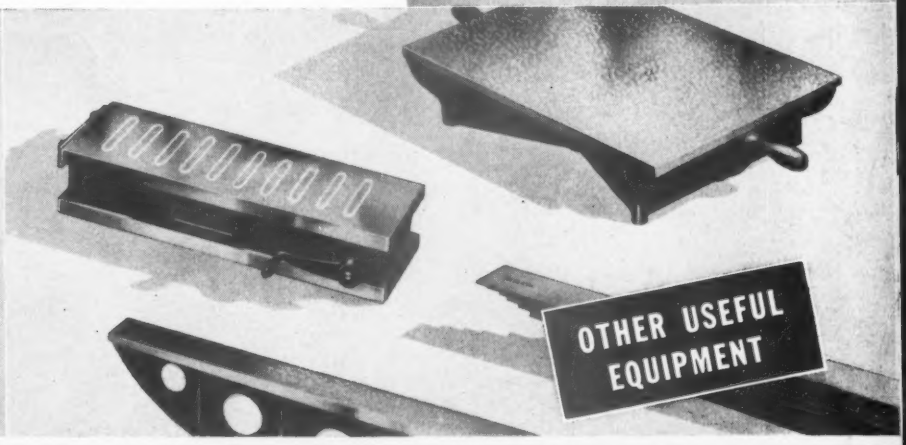

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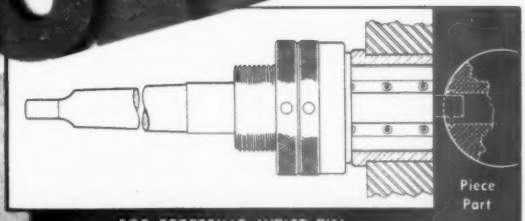
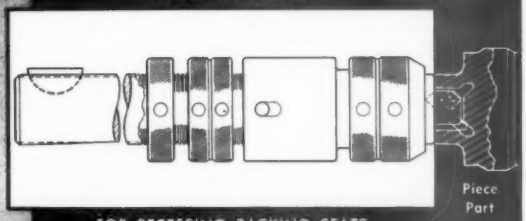
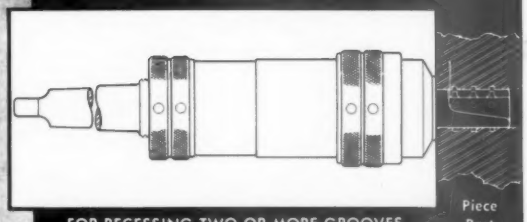
RECESSING TOOLS . . .



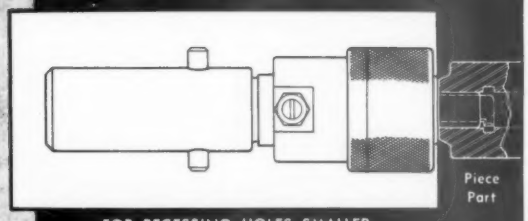
FOR RECESSING WRIST PIN HOLE IN PISTONS



FOR RECESSING PACKING SEATS AND VALVE SEATS

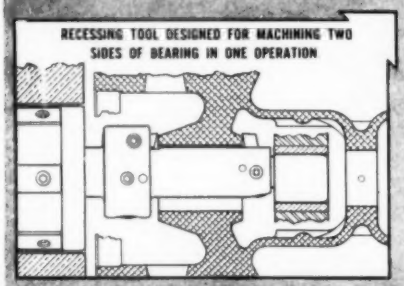


FOR RECESSING TWO OR MORE GROOVES IN CONDENSOR TUBE SHEET



FOR RECESSING HOLES SMALLER THAN $\frac{5}{8}$" DIAMETER

Send us blueprint or sketch —state type of machine to be used and we will solve your recessing problem.



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